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WE have pointed out heretofore how the failure of the Canadian reciprocity agreement, while undoubtedly affecting the future volume of railway business between the two countries, will still leave large opportunity for railway extension and connection between them. But there is one aspect of the regrettable defeat of reciprocity which must not be overlooked. It segregates Canada to her own railway policy and in the broadest, and at the same time most emphatic, sense confirms it. "Canada for the Canadians" will be a principle which the new Borden administration will apply first of all to the railways; and by the rule of contraries, if by nothing else, the divergency between Canadian encouragement of railways and our own discouragement of them seems sure to persist. This is especially true in the matter of building new lines; but it is almost equally true of the Canadian policy of non-interference with existing corporate railway administration in contrast with our own federal and state railway regulation. In Canada there is to be a policy of railway sustenance and support, probably intensified by the failure of reciprocity; here there is just the reverse policy. But the flow of capital ignores tariffs. So does the flow of emigration. He must be a blind economist who has not seen how of late our railway capital—and other capital, too—has begun to shift into Canada, how our western emigration is flowing to the Canadian West, and how our great still undeveloped Northwest must be retarded in railway development so long as railway baiting prevails. Yet in all this, after all, there is an optimistic thought. We have recently seen how the driving out of capital has forced the state of New York to modify materially her taxation of personal securities. The expulsion of capital from New York supplied precisely the vivid and concrete object lesson needed to drive the tax error home and rectify it. Canada refused us reciprocity; but if her proximity and her protective railway policy combined continue to result in transfers of our capital northward, the remedy on this side of the border line will only be a question of time, defeated reciprocity have its partial offset, and the single objective example be more forceful than the thousand previous appeals to reason.

IN the review of the annual report of the New York, New Haven & Hartford, published last week, brief reference was made to its policy somewhat unique among American railways, of extensive financing on a basis of debentures rather than mortgage bonds. The corporation has, in fact, out of $213,029,003, "mortgage bonded and secured debt," $151,593,200, or about 70 per cent., in "plain bonds, debentures and notes," as shown by its general balance sheet. Nor is this all, for the company has in the past converted large amounts of debentures into stock, and did so last year to the amount of $18,406,800. Debentures, indeed, appear to be a part of the traditional policy of the company, following the English precedent, though not to the extent of second and third debentures. The plan has certain advantages for railways. It leaves an unmortgaged or slightly mortgaged railway property as a kind of ultimate security, or to be mortgaged in case of an emergency. A long time debenture has some of the merits of a long time mortgage bond; and it lends itself readily to the theory of a subsequent general or blanket mortgage, and without injustice to the debenture holder if his security is given the right to share in any subsequent mortgage lien. Nor, in the case of a strong dividend paying road, is the real security much inferior to the mortgage bond itself. On the other hand, the debenture means a higher rate for the railway and—as distinguished from the short note—that rate often reaches over a long series of years. It cannot supply conservative "institutional" demand like that of the savings banks, held by their legal restrictions on investment; and, unless issued under the mortgage sharing proviso, the debenture is subject to the danger of senior issues that may impair the security. Finally, there is the American investment sentiment,

rooted deep in custom, that looks to the positive lien on a railway property. In spite, therefore, of the recent short note policy of solvent American railways—the short note being really but a short time debenture—there appears to be little likelihood of any expansive debenture custom; or, if it does come, it will be, as in the case of many of the debentures of the New Haven, a system with the contingent mortgage security annexed.

AFFABILITY AS AN ASSET.

THE railway superintendent who has a large division with many hundreds of employees to supervise and aggressive grievance committees to deal with needs to be strong in two opposite directions: he must have first-class executive ability, which often includes a considerable percentage of those forceful qualities sometimes summarized as "ugliness," and he must also be a skillful conciliator. The trainmaster, as the superintendent's understudy and performing many of the same duties, should be the same kind of a man. In other words, it needs an uncommon man to run the operating department of even a part of a big railway. The difficulty of finding uncommon men results in the grievance voiced by a trainmaster in a southern state, signing himself Fx, in a letter printed in another column. He finds two kinds of trainmasters, those noted for doing good work, and those noted for their suavity, and it is the last named who get the promotions. The only consolation that we can offer Fx is to try himself to add affability to his other good qualities. Moreover, it must be expected that the suave man will have the advantage at the beginning of the race, whatever may be the situation later. That his qualities have a real value is attested by the fact that such large salaries are frequently paid to salesmen who are deficient both in executive ability and in elementary education. Righteousness and truth may even at times seem to lose their primacy, because of the importance of maintaining or promoting amicable relations. A noted clergyman once, when asked by a young man as to the qualities to be looked for in choosing a wife, whether piety or amiability should be the first desideratum, promptly replied: "Amiability."

Cultivating suavity after one has arrived at the age of trainmastership is not likely to be easy, but that does not remove the necessity. Mr. Park, vice-president of the Illinois Central, has recently issued a pamphlet on the subject, in which he gives many good points. This essay is intended, no doubt, for station agents, conductors and brakemen, but there is nothing to hinder a trainmaster, or even a superintendent from acting on its precepts. For example, on page 2 we read:

"A close study of the subject should be made through contact with those who are naturally affable; those who practice successful methods of salesmanship; and those whose actions, in both official and social relations, are governed by ordinary etiquette. A study of government methods, as applied in the army and navy, as well as in diplomatic relations with other countries, is well worth the effort. There are books treating of courtesy, that will be recommended by the Educational Bureau of the company upon request. . . . The things which seem to irritate the patrons of a railway are, at times, incomprehensible. They are, apparently, passing emotions brought about by the temporary excitement of a mental condition which is abnormal. Patrons ask questions which seem irrelevant; they make unreasonable demands, or demands that cannot be complied with. 'Patience is a most necessary qualification for business; many a man would rather you heard his story than granted his request. One must seem to hear the unreasonable demands of the petulant, unmoved, and the tedious details of the dull, untired.' (Chesterfield.)"

The first two lines of that paragraph will in many cases be sufficient: study *closely* the behavior of men—men with whom all of us come in contact every day—who *naturally* possess the quality desired. If they have it naturally they manifest it in the best manner. To copy from your fellows, who, perhaps, are your inferiors in some respects does not come easy if one is at all proud; but then, humility of the right sort is an element of courtesy.

Study, and close study, must be a main element of the ambitious railway man's effort in this matter, for he is not going to make much progress until he works up enough enthusiasm, or, at least persistency, to let the subject absorb his mind for considerable periods of time, and frequently. This is necessary to avoid being superficial. A trainman or baggage agent may be the pink of politeness, yet so poorly qualified to answer passengers' questions that his pleasant manners are almost a mockery. A trainmaster may be affable, and free with cigars, yet so poorly qualified to really meet a patron's complaint that his affability is only a disappointment to the complainer. A really earnest study of this matter of pleasing people—passengers, freight-house patrons and everybody—will lead a man to improve the matter as well as the manner of his service to the public; and then he will improve so fast that he will surprise himself. Full and accurate information is the thing that the patron wants, and fullness, or even elegance of language is no substitute for it.

Our correspondent says that the "boss-grievers" get the ear of the higher officer and secure the suspension of punishments which the fair minded employees, and perhaps even the men punished, have acknowledged to be just. Here again the importance of tact comes in. Cases of this kind may often be considered simply as examples of superior suavity on the part of the grievers. Their ability to palaver is, indeed, one reason why they have been put on the committee. The trainmaster must qualify himself in the same direction—with the objectionable or insincere elements left out. He must at least study the art of cajolery; having studied the art and thus got at the viewpoint of those who practice it, as well as of those on whom it is practiced, he can himself adopt more dignified measures.

Any railway man who feels himself at all deficient in the art of courtesy will do well to get a copy of Mr. Park's pamphlet. As before observed, it appears to be written mainly for station men and trainmen, but in speaking to trainmasters we need offer no apologies for enlarging on the duties of agents and conductors, for the trainmaster needs to be as well informed concerning the nature of the agent's or conductor's duties as does the agent or conductor himself. It is true that this is a hackneyed subject and the pamphlet is a short one; nevertheless, it contains a number of suggestions of a kind not usual in railway documents. One of its most significant lessons—partly to be found, however, between the lines—is that the station agent or conductor must be well informed. Mr. Park says:

"A kind word to those in the waiting rooms, who may be too timid to ask questions, shows thoughtfulness, and is received with appreciation. Courtesy of this kind is seldom vouchsafed, and when such interest is not manifested, the impression may be given that the company's representative is taciturn and sour, although the contrary may be the case. The agent is looked upon as the company itself. He has the right to know that patrons are satisfied, and no offense can be given or taken through a polite inquiry as to whether anything can be done to assist the traveler. With the waiting room full of people, a few minutes spent among its occupants in this way may bring many dollars to the company in return. On the train, the conductor has many opportunities to increase the value of his services with a little personal effort that costs him nothing and wins smiles of approval. Many prominent and learned men have been flattered by a word of recognition from the conductor; in what esteem, then, must his affability be held by those of less importance?"

Surely an agent or conductor must be well informed if he is to satisfactorily carry out the ideas here suggested. If you offer to a passenger mere pleasantries or remarks about the weather—which may be entirely proper as ice-breakers—and if then the passenger turns around and starts to discuss the relation of the directors of the road to the state legislature or to a city grade crossing commission, you must be prepared to quickly shift from mere words to actual matters of business. Again, not the least important qualification of an affable railway man is to be able to cease anything like puffing his employer when the passenger emphasizes some really important point against the road. If an intelligent and courteous citizen enlarges on the fact that he was six months in collecting a simple claim for lost freight, and if you know that the practice of your road in settling claims is open to criticism, it is no answer to him to point to your fine parlor-car accommodations, or to the fact that station windows are now kept clean. Rather, there is need for a discreet word of regret.

The final lesson is in one word: "patience." As most railway men have to meet the attacks of the inquisitive or dull or exasperating patron when they are overworked and tired, they will agree with us that here is the rub. Some of us who think that we have already made some progress in the attainments that Mr. Park calls for are obliged to admit that this part of our theoretical good service sometimes gets neglected in practice—in *our* practice. The best watchword is that first quoted from the pamphlet: watch the men who are naturally affable. A newspaper reporter who visited the Grand Central station in New York City at a busy time the other day found the station master answering, at the average rate of six times a minute, a question which each questioner could have answered himself by turning his eyes very slightly upward and reading a dozen words printed in letters a foot high. It requires natural affability, or a very good quality of the cultivated kind, to deal with that kind of situation.

CHICAGO, INDIANAPOLIS, & LOUISVILLE.

THE Chicago, Indianapolis & Louisville has two main lines, one running from Chicago south via Indianapolis to Cincinnati, and the other from Michigan City south to Louisville. At Cincinnati the road connects with the Louisville & Nashville, and with the Cincinnati, New Orleans & Texas Pacific, and at Louisville with the Southern Railway, and with the Louisville & Nashville. The Monon is controlled jointly by the Southern Railway and the Louisville & Nashville, the two together owning 87 per cent. of the stock. Since the C. N. O. & T. P. forms the northern part of the Southern Railway's Queen & Crescent route, the Monon gives the Southern Railway and the Louisville & Nashville their line to Chicago. It enables the Southern Railway to route freight from all southern territory to Chicago. Of course, the Southern cannot successfully compete for freight, say, as far north as Washington, D. C., to be routed by way of Cincinnati, and over the Monon to Chicago, and the amount of traffic that it can get from southeastern territory is problematical, but it can compete for freight on all of its southwestern lines, and the Louisville & Nashville can solicit freight for Chicago from all of the territory that it serves.

The Monon runs through a highly competitive territory, both for freight and passenger business. In the last two years it has earned enough to comfortably pay 4 per cent. dividends on the preferred and 3¼ per cent. dividends on the common stock, and have some surplus to credit to profit and loss. Both last year and this year the two principal stockholders of the Monon could have had larger income from their investment if they had wanted it. There was, however, a change of policy in the management of the road when Ira G. Rawn became its president in 1908. Before that the road had been allowed to pursue the even tenor of its way without any attempt at all on a large scale to improve the property. Its physical condition was, therefore not very good. Since 1907, $1,150,000 has been charged for additions and betterments, which, as President Harrison points out in his annual report, is equivalent to more than 2½ per cent. per year on the common stock during the past four years. In 1911, $664,000 was spent for additions and betterments, of which $274,000 was charged to income and the remainder paid for through the sale of equipment trust certificates. The company let a contract for the installation of automatic block signals on its line between Chicago and Indianapolis, possibly influenced in part by the agitation in Indiana for block signals.

The company has adopted 90-lb. rail as its standard, and the new equipment that was ordered during the past year is much heavier than the equipment ordered heretofore. Last year the company placed 47,436 cu. yds. of ballast in track, as against 34,560 cu. yds. the year before; of the total main track, 98.87 per cent. is now ballasted. The road renewed 566 ties per mile last year, as against 363 the year before.

Considerably more was spent for maintenance of equipment last year than it has been the practice in the past to allow for this account; $879,000 being charged for maintenance of equipment in 1911, as compared with $823,000 in 1910. Twelve new consolidation engines, three Pacific type engines, 100 steel underframe automobile box cars and 200 steel underframe flat cars were added to the equipment during the year.

In the fiscal year ended June 30, 1911, the company operated 617 miles, or almost exactly the same as the year before, and earned gross $6,187,000, an increase of $167,000 over the year before; but higher operating expenses consumed more than this increase, and the company earned $713,000 available for dividends, as against $862,000 in 1910. President Harrison says: " . . . It is a fair illustration of the change in operating conditions of an American railway that six years ago, when the operating revenues for the year ended June 30, 1905, were 9.33 per cent. less than they are this year, the operating income was 19.17 per cent. greater than it is this year. . . . As the property has been well maintained, and much study has been given to operating efficiency, these increases in expenses can be traced largely to increased wages and compliance with the requirements of governmental regulating authority; though it is fair to point out that the increased terminal expenses at Louisville, incident to the congestion and construction of the property of the Kentucky & Indiana Terminal, which is used by this company were substantial, but fortunately believed to be an extraordinary factor in increasing the operating expenses of this company." We have quoted the last sentence because it shows a candor that is not by any means always displayed when railway officers publicly discuss the increased cost of operation.

Earnings from passengers amounted to $1,577,000 last year, as against $1,449,000 the year before. This is an increase of 8.80 per cent. The increase in passenger business was handled by an increase of only 1.15 per cent. in the mileage passenger trains, the total passenger train mileage last year being 1,642,000.

Of the total 3,656,000 tons carried in 1911, 1,113,000 tons, or 30.44 per cent., was manufactures and miscellaneous. This is a very high proportion of what on most railways is high class traffic taking a high ton mileage rate. In 1910 the total tonnage of all commodities was 3,520,000 tons, and of manufactures, 1,028,000 tons, or 29.15 per cent. of the total tonnage. The average receipts per ton per mile were 0.836 cents last year, as against 0.775 cents the year before. This is an increase of 7.87 per cent. in the average rate per ton mile. The tonnage of both products of mines and products of forests was proportionately less last year than the year before. The Monon has on its lines large coal fields, and during the year a traffic agreement was made with the Monon Coal Company, which agreement it is expected will result in a substantial increase in the coal traffic of the company. Last year the company carried 493,000 tons of bituminous coal, as against 486,000 tons carried the year before.

The following table compares the operations of the road in 1911 with 1910:

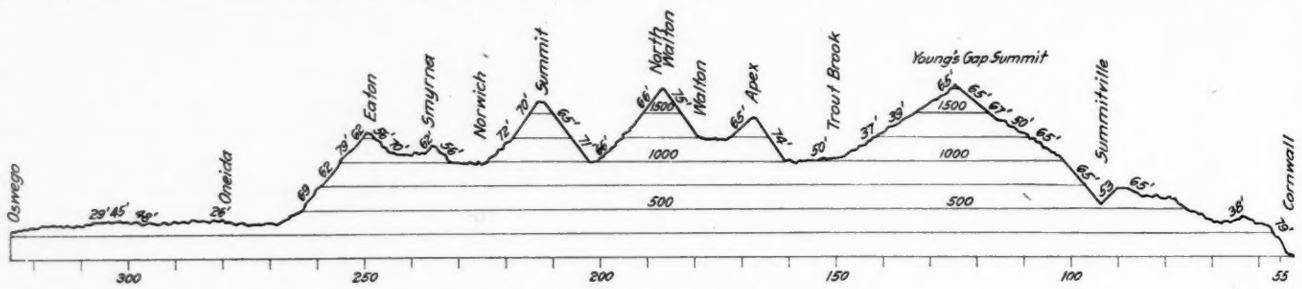
	1911.	1910.
Average mileage operated	617	616
Freight revenue	$4,054,115	$4,063,422
Passenger revenue	1,576,660	1,449,074
Total operating revenue	6,186,879	6,020,242
Maint. of way and structures	799,008	792,968
Maint. of equipment	878,722	822,785
Traffic	201,556	175,641
Transportation	2,193,184	1,973,814
Total operating expenses	4,257,163	3,948,135
Taxes	268,445	268,654
Operating income	1,661,271	1,803,453
Gross corporate income	1,865,579	2,041,408
Net corporate income	712,587	861,580
Dividends	541,250	541,250
*Surplus	171,337	320,330

*In 1911 the company charged against profit and loss the total cost of additions and betterments since 1907, namely, $1,152,123.

NEW YORK ONTARIO & WESTERN.

ANY review of the New York, Ontario & Western must consider the property in two aspects—first its character as an independent and self-supporting property; and, second, its nature as a subsidiary of the New York, New Haven & Hartford. Its latter character is, in some respects, the more important, especially as bearing on the future of the property. At present, and for the immediate future, the controlling corporation is not seeking very high development and expansion, content in the main to draw a fair dividend on the investment. But beyond are much larger potentialities.

Taking up, however, first the Ontario & Western as a separate property, the prime feature to attract attention in its annual report is its character as a coal carrying line. Out of total operating income of $9,295,702 during the last fiscal year, $4,597,202, or somewhat more than 48 per cent. was derived from the transportation of coal. Even more significant is the increase shown in this branch of the business. The $4,597,202 in 1911 compared with $3,903,739 the previous year, shows an increase of $693,463, or almost 18 per cent.; and the gross coal tonnage from the Scranton division, exclusive of coal used by the company, was 3,520,862 tons, an increase over 1910 of 652,993 tons, or almost 23 per cent. This was somewhat more than 5.4 per cent. of the output of the entire anthracite field in the calendar year 1910. Future increase of the business is forecast by the continued work of second-tracking the Scranton division, of which 43 out of 54 miles is now double-tracked, many other general improvements of coal-handling facilities and, much more



Profile of the New York, Ontario & Western.

telling the addition of 1,340 coal cars, in the list of additions and betterments. Of the coal tonnage 2,060,136 tons, or almost 59 per cent. went to tidewater at Weehawken and Cornwall, and 183,991 tons to the lakes via Oswego. Of the remainder, 1,276,735 tons, or somewhat more than 36 per cent., presumptively it went very largely to New England.

The gross operating revenue of the line shows the handsome increase from $8,578,782 to $9,295,702, almost entirely due to increased coal traffic and in spite of a loss of 65 per cent. on westbound through freight earnings due to the withdrawal last year of the differential rate allowed the company. But increased operating expenses which rose from $5,882,146 to $6,531,619, left net operating revenue only $67,447 ahead of last year. Decreases in other income and slight increase of taxes and in the deficit from outside income still left an increase in gross corporate income from $2,844,417 to $2,880,626. But the deductions decrease the surplus from dividends considerably below the previous year, or from $1,312,797 to $1,142,936, or $19,400 less than the dividends paid on the $58,113,982 of common stock and the $4,000 of preferred stock. Like so many other roads, the Ontario & Western was hit by the increase of wages, amounting to about $250,000. Had wages been the same the surplus over dividends would have been approximately $230,000, or some $80,000 better than in 1910. The increase in wages more than accounts for the increase of operating ratio from 68.56 per cent. to 70.26 per cent., the highest in seven years. But for the wage increase the ratio would have been about 67.6 per cent., the lowest in four years.

In the regular operation of the plant maintenance has been well taken care of. That of way and structures rises from $1,034,454 to $1,087,791; of equipment from $1,316,045 to $1,494,634—in these, obviously some allowance being necessary for the increase of wages, which appears on a much larger scale as an indefinite factor in the transportation expenses which rise from $3,191,408 to $3,613,220. But, besides the sums spent for maintenance is the large entry for additions and betterments, amounting to $1,420,848 for the plant and $1,703,159 for rolling stock over and above equipment retired, and reaching together $3,124,007. These have been financed chiefly by new general mortgage bonds and notes. The company is evidently preparing for a much larger increase in traffic which, with more efficient operation, ought to show next year a good increase in surplus over the normal 2 per cent. dividend. Noteworthy details of the report are an increase of 3.91 per cent. in local passenger earnings and decrease of 8.40 per cent. in through passenger earnings; an increase of 2.42 per cent. in local freight earnings and decrease of 3.77 per cent. in through freight earnings; a decrease of the large milk traffic of the country from $758,755 to $742,104, owing to adverse market conditions in New York City; an increase of the amount paid for use of foreign engines and cars from $121,302 to $273,252—an expense which the new equipment ought to reduce; a decrease of the investment in coal properties from $11,001,778 to $10,415,000; and a decrease in profit and loss surplus from $5,893,138 to $5,646,141.

Turning finally to the secondary aspect of the property involving its relations to and with the New Haven—which holds 291,622 shares of the O. & W. stock with a book value of $13,105,185, and returning about 4.44 per cent. on the investment price—the future of the property looks promising. The policy of the controlling corporation evidently looks more seriously than heretofore to the O. & W.'s development. It seems almost certain to become a more important member of the anthracite group of roads; to extend its westward business; to enlarge its coal traffic with New England; but, much the most important of all, to find early connection with an extension of the New York, Westchester & Boston northwestward from White Plains to meet the Poughkeepsie Bridge system of lines which the O. & W. taps. To this extension President Mellen in his last report specifically and approvingly refers. It will mean, and probably at a date not far away, practically an all-rail coal and general freight route of the Ontario & Western to the center of the swiftly growing Bronx, and intrenchment there in a large distributing terminal.

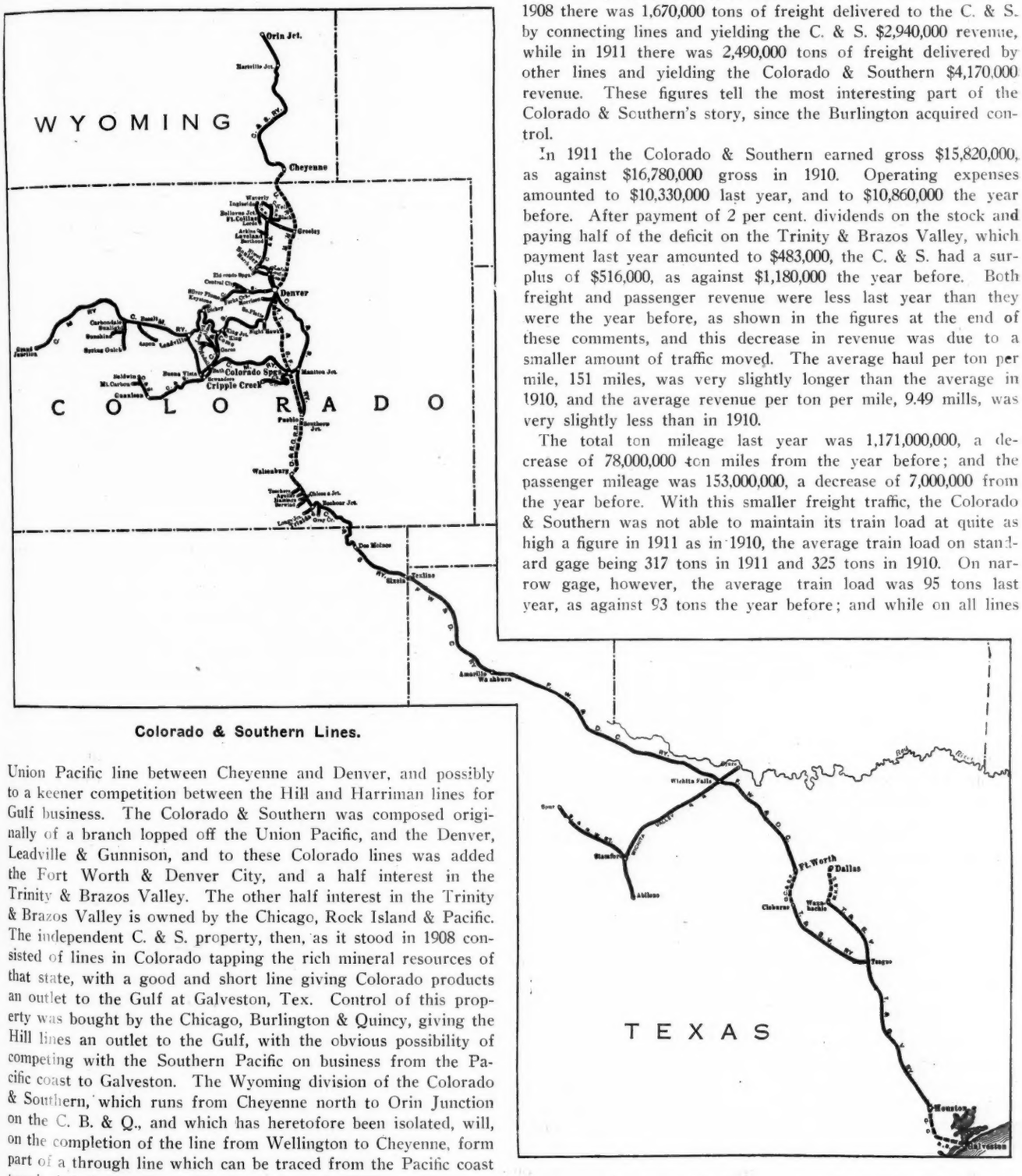
Annexed is a table showing the more important results of the operation of the Ontario & Western in 1911 and 1910:

	1911.	1910.
Mileage	882	846
Freight revenue	$7,318,954	$6,649,635
Passenger revenue	1,626,619	1,592,250
Total operating revenue	9,295,702	8,578,782
Maintenance of way and structure	1,087,791	1,034,454
Maintenance of equipment	1,494,634	1,316,045
Traffic	125,562	139,243
Transportation	3,613,220	3,191,408
Total operating expenses	6,531,619	5,882,146
Taxes	214,990	211,693
Operating income	2,764,083	2,696,636
Gross corporate income	2,880,626	2,844,417
Net corporate income	1,142,936	1,312,797
Dividends	1,162,336	1,162,328
Surplus	*19,400	150,469

*Deficit.

COLORADO & SOUTHERN.

THE Colorado & Southern has now decided to build a line of its own between Wellington, Col., the northernmost point on the Fort Collins district, to Cheyenne, Wyo., connecting there with the Chicago, Burlington & Quincy. Heretofore the company has used the Union Pacific between Denver and Cheyenne. This change is due to the increased business on the Union Pacific line between Cheyenne and Denver, and possibly to a keener competition between the Hill and Harriman lines for Gulf business. The Colorado & Southern was composed originally of a branch lopped off the Union Pacific, and the Denver, Leadville & Gunnison, and to these Colorado lines was added the Fort Worth & Denver City, and a half interest in the Trinity & Brazos Valley. The other half interest in the Trinity & Brazos Valley is owned by the Chicago, Rock Island & Pacific. The independent C. & S. property, then, as it stood in 1908 consisted of lines in Colorado tapping the rich mineral resources of that state, with a good and short line giving Colorado products an outlet to the Gulf at Galveston, Tex. Control of this property was bought by the Chicago, Burlington & Quincy, giving the Hill lines an outlet to the Gulf, with the obvious possibility of competing with the Southern Pacific on business from the Pacific coast to Galveston. The Wyoming division of the Colorado & Southern, which runs from Cheyenne north to Orin Junction on the C. B. & Q., and which has heretofore been isolated, will, on the completion of the line from Wellington to Cheyenne, form part of a through line which can be traced from the Pacific coast terminals of the Great Northern through Billings, Mont., to Galveston, the C. B. & Q., having plans for a line from Orin, Wyo., to Thermopolis.



Colorado & Southern Lines.

In 1908 the Colorado & Southern carried a total tonnage of freight amounting to 6,680,000 tons, of this total, 75.03 per cent. originated on C. & S. lines and 24.97 per cent. on foreign lines. In the fiscal year ended June 30, 1911, the C. & S. carried 7,770,000 tons of freight, of which 67.93 per cent. originated on C. & S. lines, and 32.07 per cent. on foreign lines; or, put in a different way, in 1908 there was 5,100,000 tons of freight originating on the company lines and yielding $7,070,000 revenue, while in 1911 there was 5,270,000 tons originating on company lines and yielding $6,950,000 revenue. On the other hand, in 1908 there was 1,670,000 tons of freight delivered to the C. & S. by connecting lines and yielding the C. & S. $2,940,000 revenue, while in 1911 there was 2,490,000 tons of freight delivered by other lines and yielding the Colorado & Southern $4,170,000 revenue. These figures tell the most interesting part of the Colorado & Southern's story, since the Burlington acquired control.

In 1911 the Colorado & Southern earned gross $15,820,000, as against $16,780,000 gross in 1910. Operating expenses amounted to $10,330,000 last year, and to $10,860,000 the year before. After payment of 2 per cent. dividends on the stock and paying half of the deficit on the Trinity & Brazos Valley, which payment last year amounted to $483,000, the C. & S. had a surplus of $516,000, as against $1,180,000 the year before. Both freight and passenger revenue were less last year than they were the year before, as shown in the figures at the end of these comments, and this decrease in revenue was due to a smaller amount of traffic moved. The average haul per ton per mile, 151 miles, was very slightly longer than the average in 1910, and the average revenue per ton per mile, 9.49 mills, was very slightly less than in 1910.

The total ton mileage last year was 1,171,000,000, a decrease of 78,000,000 ton miles from the year before; and the passenger mileage was 153,000,000, a decrease of 7,000,000 from the year before. With this smaller freight traffic, the Colorado & Southern was not able to maintain its train load at quite as high a figure in 1911 as in 1910, the average train load on standard gage being 317 tons in 1911 and 325 tons in 1910. On narrow gage, however, the average train load was 95 tons last year, as against 93 tons the year before; and while on all lines there was almost exactly the same number of loaded cars per train mile in 1911 as in 1910, there was on an average 7.31 empty cars last year, as against 7.10 in the year before.

Operating expenses as a whole last year actually showed a small decrease, as shown in the comparative figures herewith;

but only a part of the total decrease came in transportation expenses. Maintenance of way and structures cost $1,690,000 in 1911, as against $2,190,000 in 1910, but maintenance of equipment, on the other hand, cost $2,780,000 last year, as against $2,520,000 the year before. Less was spent last year for ties; rails; bridges, trestles and culverts; buildings, fixtures and grounds; and roadway tools and supplies than in 1911, and only $348, under the head of maintenance expenses, was spent for ballast.

In 1911 the C. & S. spent a total of $4,770,000 for improvement and extension of the property not chargeable to maintenance expenses. Of this amount, $2,270,000 was for new lines and extensions and $2,500,000 for additions and betterments. The largest items under additions and betterments are $1,570,000 spent for freight train cars, $325,000 spent for locomotives, $122,000 spent for bridges, trestles and culverts, and $89,000 for crossings and signs. In 1911 $3,407,000 refunding and extension mortgage bonds was sold to reimburse the treasury for capital expenditures. At the end of 1911 the company had $1,480,000 cash and total working liabilities of $2,670,000. The profit and loss surplus on June 30, 1911, was $10,340,000, as against $9,270,000 at the end of 1910.

The following table shows the principal figures for operation of the Colorado & Southern in 1911, as compared with the previous year, 1910:

	1911.	1910.
Average mileage operated	2,015	2,042
Freight revenue	$11,120,361	$12,040,828
Passenger revenue	3,870,672	3,918,093
Total operating revenue	15,824,065	16,777,981
Maint. of way and structures	1,688,223	2,188,645
Maint. of equipment	2,779,143	2,521,273
Traffic	239,692	274,271
Transportation	5,112,952	5,378,794
Total operating expenses	10,334,111	10,863,455
Taxes	478,323	477,870
Operating income	4,978,345	5,414,333
Gross corporate income	5,623,566	6,041,959
Net corporate income	2,298,592	2,951,633
Dividends	1,300,000	1,300,000
Half of def. of Trinity & Brazos Val.	482,598	466.718
Surplus	515,994	1,184,915

NEW BOOKS.

An American Railroad Builder—John Murray Forbes. By Henry Greenleaf Pearson. Boston: Houghton, Mifflin Co. Cloth; 5 in. x 7½ in.; 196 pages. Price, $1.25 net.

This is a biographical sketch of one of the most gifted men in American railway history. Col. Forbes, who died in 1898 at the age of 86, was an important figure in the Michigan Central and the Chicago, Burlington & Quincy for many years, and this book is an entertaining sketch of his activities in those fields. Extracts from advance sheets of the book were published in the *Railway Age Gazette*, December 2, December 23, and March 31 last. Mr. Pearson's work is made up in part of extracts from letters and other data written by Col. Forbes himself. The reader will find that Forbes was a vivid writer, and that Mr. Pearson has edited his material with excellent judgment. As is observed by the publishers in their circular, stories of the wise, honest and public-spirited work done by men like Forbes in the railway field deserves attention, not only because of their own intrinsic worth, but also as an offset to those narratives which have perhaps been given undue prominence in the literary world, which have told of the evil deeds done in connection with roads of unfortunate memory. The subject of this sketch was a man of imagination, of daring and of militant honesty; and, although he flourished long before the troubles of rate making and governmental activities were with us, his career will furnish entertaining reading to every railway man who takes an interest in "human documents," and in the formative period of the railway era.

Letters to the Editor.

WEAKNESSES IN TRAIN OPERATION.

August 27, 1911.

To the Editor of the Railway Age Gazette:

Your editorials of August 11, 18 and 25, and the letter signed "L. N. S.," concerning discipline of enginemen, bring up a subject in which all right thinking American citizens should be interested. No one can deny that railway officers are vitally interested in the correct solution of this important problem. They are giving it their best thought. That it has not been solved proves that it is a problem not easy to solve.

Have not the men who direct the destinies of the trainmen and station men gone too far with the "get along with the men" idea? The trainmasters, and other minor officers, who know how trains ought to be operated, and insist on the men who operate them doing it strictly in accordance with the rules and safe practice; who administer the necessary discipline to insure it being done when the occasion demands, are not the ones who are promoted, as a rule. And the men in similar positions who wink at gross violations and unsafe practices; who O. K. time slips as turned in without inquiring whether the overtime which is claimed was actually earned, are the ones who usually "get along with the men." And, however, much we may regret to have to say it, they are also usually the ones who are promoted. There are some shining exceptions.

It requires no difficult process of reasoning to get the result of this practice; and the railways are suffering from it.

The bugaboo about this officer or that offiecr not getting along with the men, usually originates in the brains of the grievance committee, and is directed against some honest officer who knows what is right and has the moral courage to stand up for it. But the grievance committees are "the men," and they are the men who reach the general officers' ears. We all have known of cases where division officers administered discipline that was just and for the good of the service, and that met with the approval of a majority of the men on the division; yet which the grievance committee has had reversed on the plea "that it would have a good effect on the men." Instead of "seeing that the offence does not occur again," the committee usually succeeds in bringing about a condition where the men who make trouble report to, and receive their instructions from the chairman of the grievance committee instead of the officer designated in the rules.

Fx.

FOREIGN RAILWAY NOTES.

Locomotive and car building in Austria seem to be in a bad way. Three locomotive works report their output in 1910 as 45½ per cent. less than in 1909, and the number of their employees was reduced from 4,796 to 3,056. The association of car builders reports that it had orders for 10,500 cars in 1908, 6,400 in 1909, and 4,700 in 1910; while the prospect is for only 1,700 this year. These works are able to build 16,000 cars yearly.

Nearly one-fourth, by weight, of the locomotive fuel used in Russia in 1908 was petroleum or petroleum residuum. A ton of petroleum costs as much as 2.55 tons of coal, and in Asia it serves for a little less than twice as many miles, but in Europe for only 64 per cent. more—perhaps due to a greater use of residuum in Europe. A table giving the relative heating value of different fuels gives 69 units of petroleum as equivalent to 110 of English coal, and to 273 of a coal produced in eastern Siberia. The cost of locomotive fuel in 1908 was 14.78 per cent. of the total working expenses of the Russian railways. It has to be hauled long distances for some of the lines.

INTERLOCKING AT THE NORTH WESTERN STATION, CHICAGO.*

BY J. A. PEABODY,
Signal Engineer, Chicago & North Western.

In the new passenger station of the Chicago & North Western in Chicago there are 16 tracks. These merge at the north end of the station into a six-track throat, which divideds into two four-track approaches, one from the north and one from the west as shown in Fig. 1. On the line to the north the signaling extends to the junction of the Wisconsin and Milwaukee divisions, near Division street. On the west approach it extends to the junction with the four tracks of the Galena division near Noble street.

INTERLOCKING PLANTS.

There are five interlocking plants in the terminal:

1. Lake street, at the entrance to the station yard.
2. Clinton street, at the junction of the north and west approaches.
3. Noble street, at the junction of the west approach with the Galena division.
4. Division street, at the junction of the north approach with the Wisconsin and Milwaukee division; and
5. Carpenter street, at the junction of the north approach and the old Milwaukee and Wisconsin division tracks.

The interlocking machines are all of the standard unit-lever type, made by the General Railway Signal Company.

There is an apparent duplication of derails on some tracks within the Clinton street plant. The derails farthest from the fouling point were installed to comply with the Illinois rules requiring 500 ft. of protection on main tracks for facing moves, while those near the fouling point protect against trailing moves; and since they are located at clearance points allow conflicting routes to be set up as soon as the train passes them, instead of holding these routes until a train passes the derail farthest away.

SIGNALING.

In developing the signaling to be used, the then standard practice of the road, which combined the use of the two-position lower quadrant semaphore signal for interlocking with the disk signal for automatic blocking was compared with the three-position upper quadrant semaphore signal for all purposes. The latter was adopted, with the result that but 90 signals were required instead of 150 under the old standard; and the number of signal aspects was reduced and the method of giving information to the engineman simplified. The aspects of the signals are in the upper quadrant and are arranged according to the latest recommendations of the Railway Signal Association. A green light means proceed; red, stop; and the combination of the red and green, caution. The lamp which is used in the combination has but one burner and a reflector furnishes the second light. This lamp was designed in 1889 by E. C. Carter, chief engineer, and has been standard of the Northwestern since that time.

At the Lake street plant, information as to the position of the signal ahead as well as the proceed and stop signals, is given by one dwarf signal using three positions. This secures the safe handling of trains at reasonable speed and the absolute safety and reliability of the practice has already been satisfactorily shown. Also at this plant, the third position of the last signal governing trains inbound into the station is used to indicate that the track under the train shed is clear. The dwarf signals are all motor driven and, except at the Lake street plant, are used in the horizontal and diagonal positions only.

For tracks which are signaled so that trains may be run in either direction at any time, traffic levers are installed in each of the interlocking machines in order to prevent trains being started in the opposite direction on one of these tracks at the same time as, or against, an approaching train, and to provide protection in case of emergency when it is necessary to reverse traffic on any of the other tracks. These levers are controlled in the same manner as the signal levers in manual blocking machines so that signals cannot be given for a movement on to a track until the traffic levers controlling the movements to that track are in the proper position in the towers at both ends of the track.

COMMUNICATION AND INFORMATION.

The means of intercommunication between the various points of the terminal comprise (1) conductors', towermen's and gatemen's annunciator system; (2) telautograph; (3) various automatic train annunciators and indicators; (4) illuminated track diagrams; (5) lights over levers; (6) the intercommunicating system, and (7) the telephone system.

The system of annunciators generally known as the "C. T. G." system is used for the starting of trains from the station. Each of the station tracks holds two trains and the "C. T. G." equipment for each track is, therefore, in duplicate. Four boxes containing conductors' lights and push buttons are mounted on posts on the platform, the equipment including two telephones on each platform. The director's table in the Lake street tower has three lights and a push button for each of the two possible trains on each of the 16 tracks in the train shed. The gatemen's lights are on the concourse and the push buttons are on the track side of the gate posts of the partition dividing the main concourse from the train shed. For through trains the conductor pushes his button one minute before leaving time. This lights the top light on the director's table in the Lake street tower and the first light on the gateman's indicators reminding them that it is about leaving time. If the director can handle the train on time he replies by pushing a button, which puts out the top light and leaves the second light on his table, and also puts out the first and lights the second light at the gate, and also lights the top light of the conductor's indicator.

When it is time for the train to leave, the gateman closes his gate and after giving the last passenger who went through sufficient time to get on the train he pushes his button. This extinguishes the second light at the gate, puts out the conductor's top light, and lights the lower one, and puts out the second and lights the third of the tower director's light, thus advising both the conductor and director that the train may leave. The conductor then signals the engineman to proceed, which he does if the signal indicates that he may. The restoring of the first interlocking signal to the stop position automatically restores the annunciator system. For suburban trains the conductor pushes his button ten seconds before leaving time and receives no answer, as to avoid congestion these trains must leave on time. Before a train which has discharged its passengers can back out of the station a signal must be received from the director.

This system gives the tower director absolute control of all trains in the station, so that he can make the utmost use of track room, and in actual practice is simple, rapid, and easily understood.

The Gray telautograph system has three transmitters and 19 receiving stations. The transmitters are in the two division despatchers' offices and in the Lake street tower. Receiving stations are so distributed that every employee about the station who should know about incoming trains is kept informed.

The telephone system includes a line for direct communication between adjacent interlocking towers, and a local system at each plant. There is a permanent telephone on each home signal bridge. Annunciators controlled automatically by the track circuit relays announce to the towerman the approach of trains. When a detector circuit is occupied, the small light mounted under ground glass over each switch lever is extinguished, and when the track is free the light burns. The Lake and Clinton street towers have illuminated track diagrams. The necessary information is so clearly and completely shown in the illuminated

*From a paper presented at a special meeting of the Western Society of Engineers, September 20.

TRACK AND CONNECTIONS.

The General Railway Signal Company's standard No. 4 switch movement is used for everything except derails, to which standard No. 2 movements are applied. There are no detector bars on the switches and derails of the Lake and Clinton street plants, detector circuits only being used at these points. In the other three plants, where trains run faster both detector bars and detector circuits are employed.

CIRCUITS.

For the controlling electric circuits the positive current is fed to the bus bars located on the machine, and the negative is split into sections depending upon the size of the plant. Each common wires passes through the circuit breaker on the operating switchboard. Each of these circuit breakers is controlled by a polarized relay on the board, and one on the interlocking machine for each lever controlling units in the section of the plant fed by that common. Whenever current flows through the polarized relays in the direction opposite to that of the indication current (as it will in cases of crosses or grounds) the polarized relay will open and in turn will open the circuit breaker and cut the power from that section of the plant. If the current still flows it will find a path through a relay which is in multiple with the points of the circuit breaker and this will cause a red lamp to be lighted, and as long as this relay

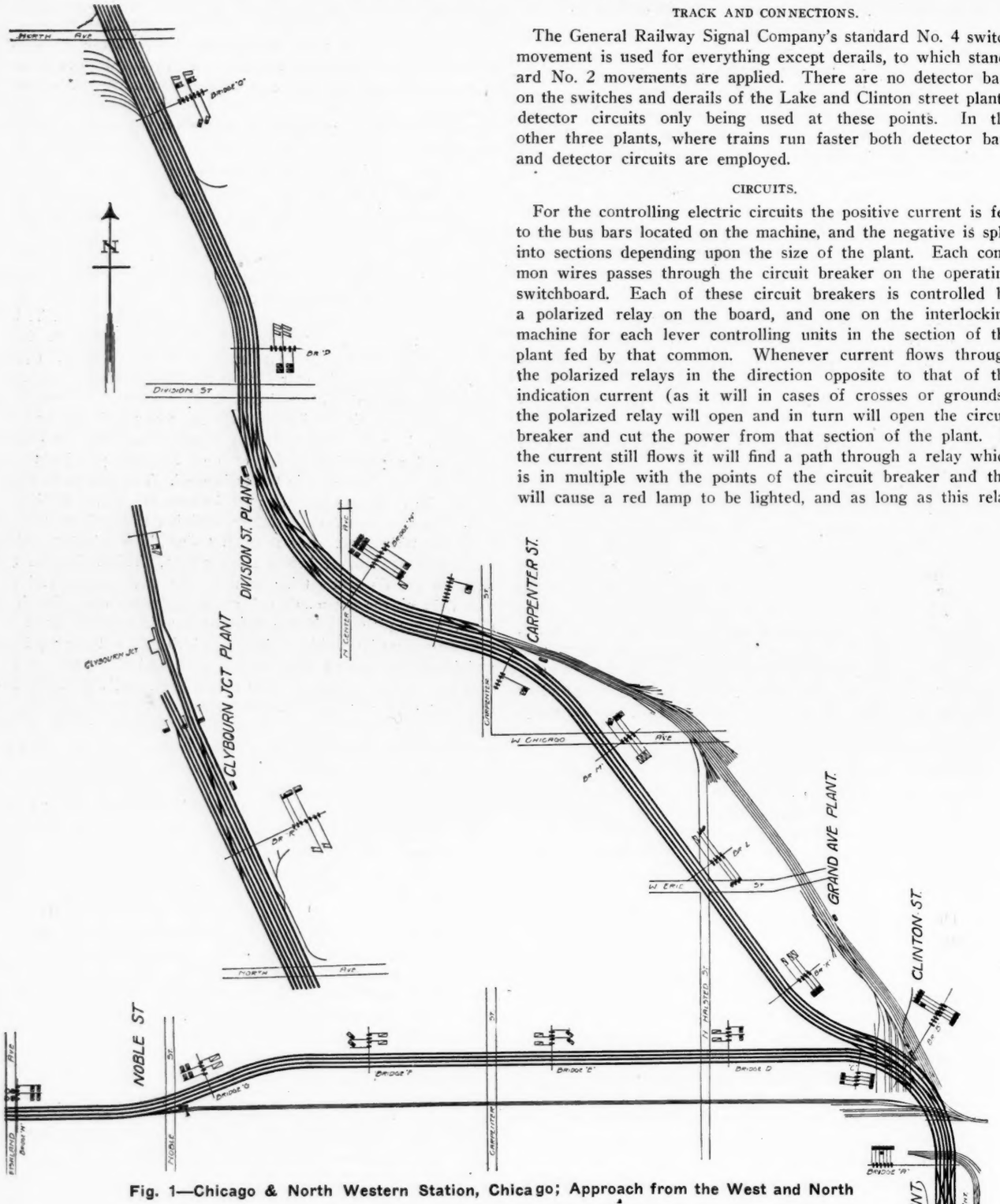


Fig. 1—Chicago & North Western Station, Chicago; Approach from the West and North

diagram that it is possible on stormy days and at night to operate the terminal without the towerman seeing the trains.

For communicating between towers as to movements and character of trains a push button scheme known as the intercommunicating system was developed. Small telephone lamps mounted in horizontal rows and vertical columns, the former representing the classification of trains and the latter the track numbers, are mounted in the towers, and are arranged so that the necessary information may be transmitted from one tower to another by manipulation of the buttons.

is energized the main circuit will be held open, so that closing the circuit breaker will not restore the current as long as the trouble exists. Clearing the trouble, however, automatically puts out the red light and closes the circuit. A 2-c. p. 110-volt lamp with a suitable switch is used as a ground detector.

The dwarf signals are of the Model 2-A type, made by the General Railway Signal Company. The motor is geared directly to the spindle on which the blade is mounted and to which are also connected springs to force it back to its normal position when released. The motor while running backward generates current, which energizes the indication magnet and releases the lever. The load imposed on the generator brings the mechanism to an easy stop, accomplishing the purpose of a dash pot. The common wires for the dwarf signals pass through switch boxes on all facing derails to insure that the derails are off the track before the signal can be cleared. The high signal mechanism is of the same type as the dwarf, the interlocking signals being operated at 110 volts. All high signals are slotted. The approach signals are similar to the interlocking signals, but operate on 16 volts instead of 110.

The lights on the signal levers are selected through switch levers and relay points to indicate as follows: No light, when there is no route prepared; green light, when there is a route lined up and unoccupied; red light, when there is a route lined up and occupied.

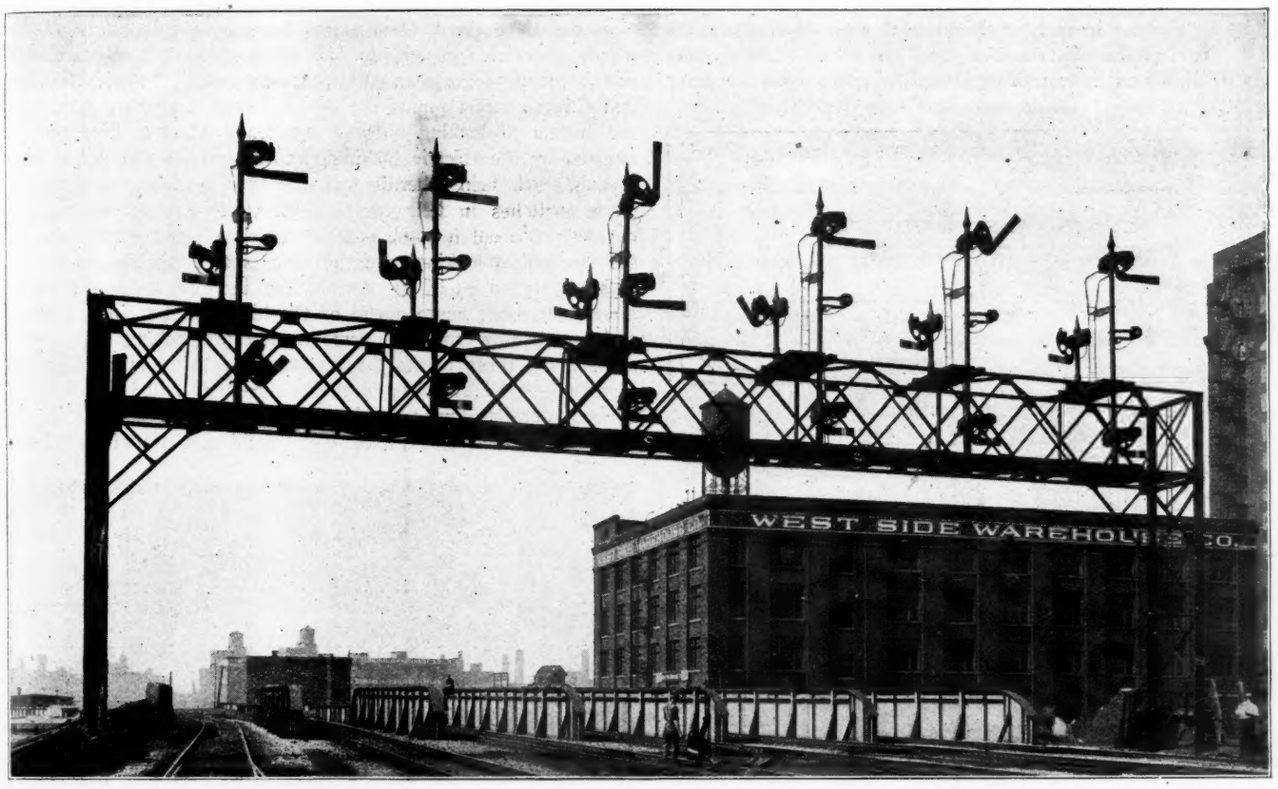


Fig. 2—Bridge A, Between Lake Street and Clinton Street Towers. Signals on High Masts Are Controlled from Clinton Street Tower, and Signals on Low Masts from Lake Street Tower.

TRACK CIRCUIT FEED.

The track circuits for the interlocking plants are fed by loops, as shown in Fig. 3, from the 20-volt storage batteries in the towers. The wires of the same polarity are joined at the end, forming the loops and giving the current from the switchboard two paths to any point on the loop. Thus the wires may be broken at any place and other points will still receive current. Two positive and two negative wires are run through a low-voltage distributing board to junction boxes in the plant to

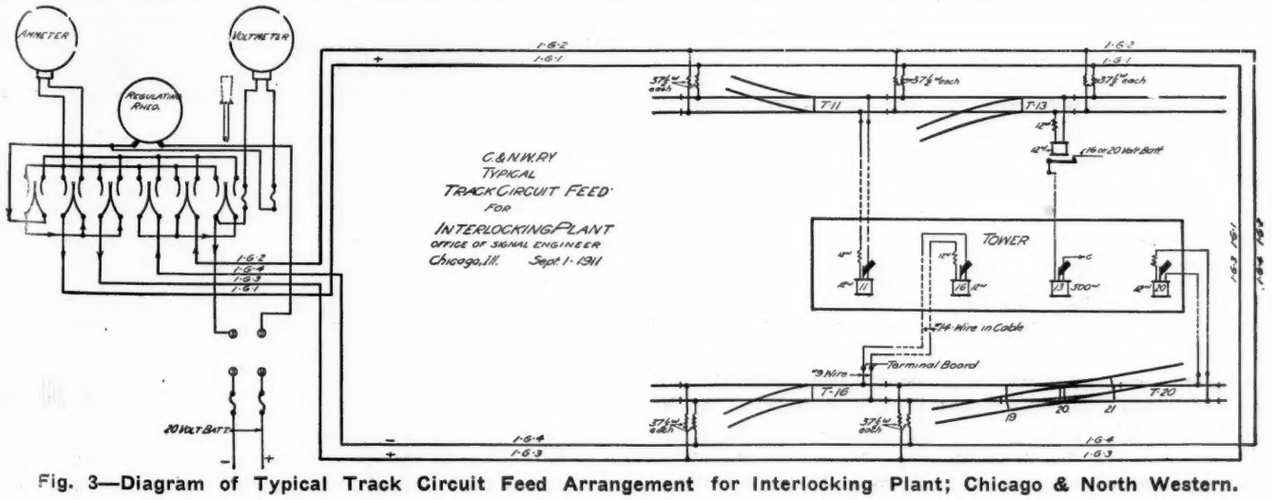


Fig. 3—Diagram of Typical Track Circuit Feed Arrangement for Interlocking Plant; Chicago & North Western.

be fed. Ammeter jacks for each wire and for the main feed wires after the loop wires are joined are placed on the switchboard, and a regulating rheostat is inserted in the positive lead for cutting the battery down to 12 volts, at which it is generally maintained. The track sections are fed through the various points on the loop through resistance units of the enclosed fuse type and averaging 37½ ohms. The limit to the number of circuits that could be fed from the lead was found to be 20. Relays of 12-ohm resistance are used on all of these circuits and a 12-ohm resistance unit is placed in series with the relay

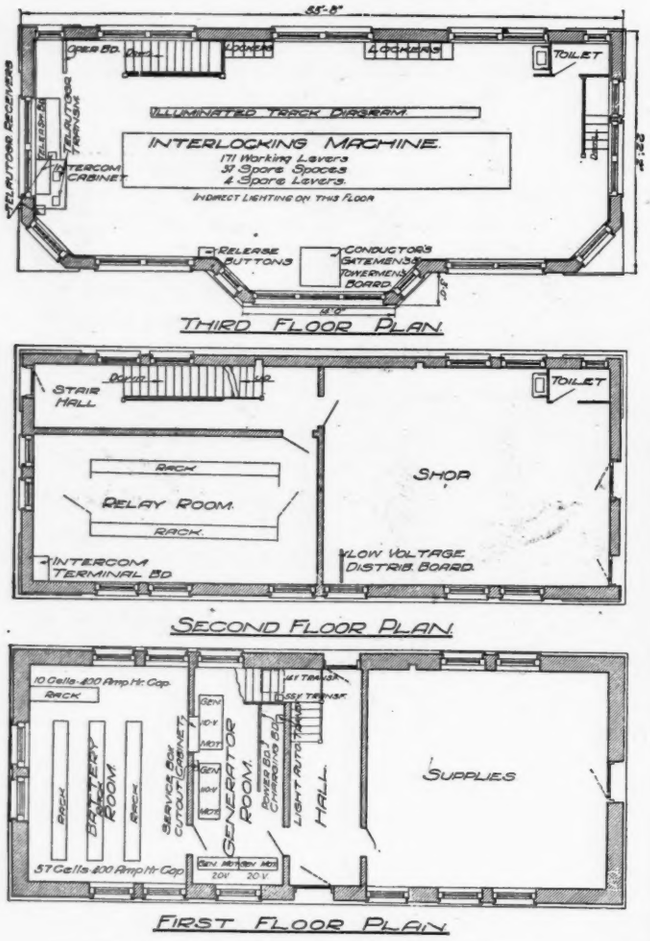


Fig. 4—Floor Plans of Lake Street Tower.

to obtain a quicker drop-away of the armature on account of the detector locking.

Where the track sections are adjacent to the towers track relays are placed in the towers. Repeater relays in the tower are controlled by those track relays which are set adjacent to their sections. Motor generator sets run from the station depot lighting system, successively in six-hour periods fed direct to the train shed track circuits.

At the signal bridges at which power houses are located the track circuits are fed through a single cell of 120 ampere-hour capacity storage battery with an 8-ohm resistance in series. Four-ohm relays are used where the track circuit is fed from these individual cells.

RELEASE ROUTE LOCKING.

Release route locking circuits are employed at Lake, Clinton and Division streets only. In operation a train entering a route locks up all switches, derails and movable point frogs in the route, and as the wheels leave each track section the switches, derails and movable point frogs in that section are released so they may be moved for the setting up of a new route. The levers are controlled by electric locks located on top of the lever, the circuit being held normally open by a contact operated by the lever latch. A white light in multiple with the lock and latch contact shows whether or not the lock can be energized. Each lock is controlled directly by the track relay of the section in which the switch is located, providing absolute detector locking and making it impossible to throw a switch when the section in which that switch is located is occupied.

In the Lake street plant signal locking only is employed, by means of which signal levers lock their routes and switch levers do no locking except in a few special cases. In the Division and Clinton street plants the derail levers lock the routes, and the system of locking allows very nearly the complete release effected by the electric locking and still retains the derail protection. All facing derails lock the trailing derails and facing point switches in their routes. At Clinton street, where two derails are used in some spaces, the slow speed derails do all the mechanical locking, and the circuits of conflicting high signals are controlled by the derails. At the Carpenter and Noble street plants the route ahead of the high speed train is locked, and on all slow speed movements detector locking only is installed. In these plants the mechanical locking is as follows: Derails lock all switches in the route; high speed derails lock back-up derails; lower number locks the higher number in derails of the same class; mechanical locking is transferred from

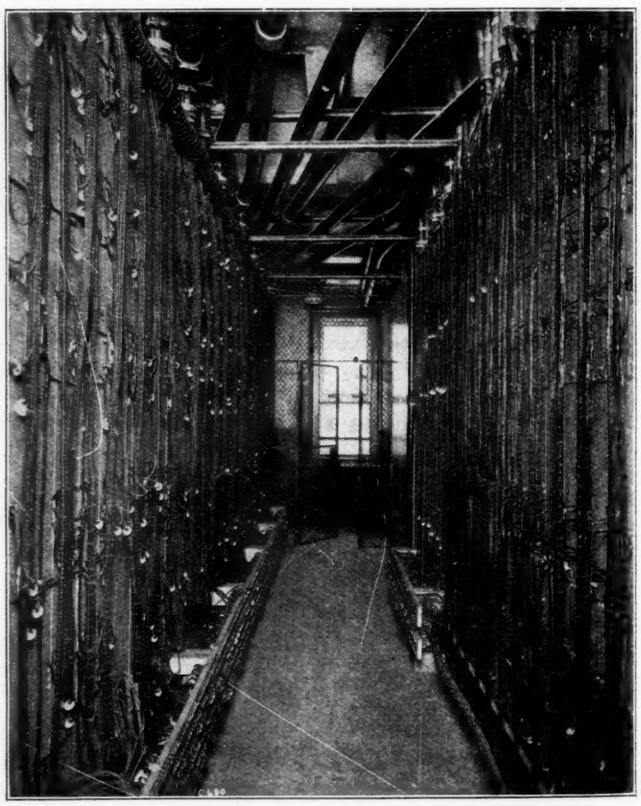


Fig. 5—Wiring on the Backs of the Relay Racks in Lake Street Tower; Chicago & North Western.

derails to signals to allow necessary freedom when the special release feature is required.

INSTALLATION OF WIRING.

On account of the great mass of wires required it was necessary to furnish detailed plans showing exactly how each piece was to be accomplished, and the workmen were required to follow this plan without any knowledge of the complete circuits involved. Plans for junction boxes, terminal boards and manholes on the ground and on signal bridges and also for the terminal boards in the tower were made to show which wires were to be spliced through, wires to be connected to terminals

and the location of terminals and resistance units. Plans of the conduits were made to show the location and size of each, and tables were furnished giving the number and size of the wires in each duct, the total length of each wire, its number, destination and the number of feet to be left out at each end. In addition, plans were furnished of the backs of relay, combination boards, interlocking machine, releases, etc., showing the details for connecting the wires, using the tag numbers to identify them. The circuit sheets were written instead of drawn. This work of the drafting room saved an immense amount of labor in the field.

POWER DISTRIBUTION SYSTEM.

Power for all uses except the operation of the Lake street plant is taken from the power house at 6,600 volts, three-phase, and distributed through a conduit system. The current is transformed to 220 volts, three-phase, for power purposes and for 220 volts-110 volts, single phase, for lighting purposes. Transformers located near each tower supply current for purposes in the tower and also for the nearby signal bridges. The remaining transformers are so located as to supply two or more outlying signal bridges. The lighting transformers are arranged in boards, with secondaries in multiple, so that there are two sources of power for each circuit, either transformer being able to carry the total load. Induction motor generator sets are provided in duplicate for each battery located in the towers. The generators are shunt wound, with wide variation of voltage. A motor generator is running continuously in multiple with each battery, taking most of the load, the battery helping out on the peaks. Automatic underload circuit breakers are provided for opening the generator circuits in case of failure of the alternating current supply. At the power houses located at signal bridges the motor generators are of the same type as those in the towers, the volt range being from 4 to 40. The generators are capable of charging from 1 to 16 cells of battery.

Where storage batteries are located at the signal bridges they are provided in duplicate with a motor generator set for charging. A three-phase, 220-volt relay operated in parallel with the motor controlling the charging circuits provides for the possibility of the alternating current failing or a fuse opening in the motor end. Whenever either of these happens this relay opens

STATISTICS OF MATERIALS AND UNITS ON THE NORTH-WESTERN TERMINAL.

	Lake Street Interlocking.	Clinton Street Interlocking.	Carpenter Street Interlocking.	Division Street Interlocking.	Noble Street Interlocking.	Wisconsin Division Automatic.	Galena Division Automatic.	Station.	Totals.	
Signal motors, 1-6 h.p.	67	62	23	31	21	16	15	....	235	
Switch motors, 1 h.p.	98	77	32	51	30	....	....	....	288	
Motor generators, 110 v. d.c.	2-12.5 h.p.	2-12.5 h.p.	2-5 h.p.	2-7.5 h.p.	2-5 h.p.	....	....	2-½ h.p.	10	
Motor generators, 20 v. d.c.	2-12.5 h.p.	2-2.5 h.p.	2-1 h.p.	2-1.5 h.p.	2-1 h.p.	4-2 h.p.	....	2-½ h.p.	12	
Motor generators, 4 v. 40 v. d.c.	....	....	....	....	....	4-2 h.p.	4-2 h.p.	....	8	
									553	motors
									30	generators
Storage battery, 110 v.	57 cells 400 a.h.	57-400	57-160	57-240	57-160	....	....	....	285	
Storage battery, 20 v.	10 cells 400 a.h.	10-400	10-160	10-240	10-160	....	....	....	50	
Storage battery, 16 v.	....	....	....	....	....	8 sets-8 cells 120 a.h.	8 sets-8 cells 120 a.h.	....	128	
Storage battery, 2 v.	....	....	....	....	....	38-120 a.h.	30-128 a.h.	....	68	
									531	cells storage battery
Lamps—										
On signals, 2 c.p. 110 v.	134	68	30	46	27	32	30	....	367	
On levers, 1 c.p. 55 v.	196	183	72	114	70	....	....	....	635	
On illuminated track diagram, 4-watt. 14 v.	924	419	....	....	....	....	....	....	1,343	
On intercommunicating diagram, 20 v. tel.	22	158	54	45	11	....	....	....	290	
On telephone switch board, 20 v. tel.	51	....	....	....	....	....	....	....	51	
On conductor, towerman, gateman, 20 v.	96	....	....	....	....	....	....	....	96	
On conductor, towerman, gateman, 2 c.p. 20 v.	....	....	....	....	....	....	....	274	274	
On tower lighting	....	....	....	....	....	....	....	....	....	
									3,056	lamps
Relays and indicators	255	160	46	92	32	31	29	32	677	
Relays, intercommunicating	22	158	54	45	11	....	....	....	290	
Relays, telephone	57	....	....	....	....	....	....	....	57	
									1,024	relays
Transformers—										
Power, single phase, 220 v.	3-10 k.w.	....	....	....	....	....	....	....	3	
Power, three phase, 220 v.	....	1-20 k.w.	1-7.5 k.w.	1-7.5 k.w.	1-7.5 k.w.	1-2 k.w.	1-2 k.w.	....	6	
Light, single phase, 220 v.	1-2.5 k.w. auto.	2-3 k.w.	1-3 k.w.	1-3 k.w.	1-3 k.w.	2-3 k.w.	2-3 k.w.	....	10	
Lever light, 55 v.	1-1 k.w.	11-1 k.w.	1-½ k.w.	1-½ k.w.	1-½ k.w.	....	....	....	5	
Illuminated track diagram, 14 v.	1-5 k.w.	.5 k.w.	....	....	....	....	....	....	2	
									26	transformers

48,710 feet rubber lead cable	1,214,500	feet of wire.
13,890 feet paper lead cable	910,650	feet of wire.
90,500 feet linen lead cable	122,500	feet of wire.
	578,835	feet loose wire rubber covered.
153,100 feet lead covered cable	2,826,485	feet of wire.

Levers—										
High signals	....	29	8	12	10	....	....	....	59	
Dwarf signals	67	33	15	21	11	....	....	....	147	
Switches	29	26	7	25	7	....	....	....	94	
Double slip switches (ends)	46	12	8	6	8	....	....	....	80	
Movable point frogs	23	6	4	3	4	....	....	....	40	
Derails	....	33	13	17	11	....	....	....	74	
Traffic locks	6	14	6	6	4	....	....	....	36	
Total working levers	171	153	61	90	55	....	....	....	530	
Spare high signal levers	....	6	....	2	8	....	....	....	16	
Spare dwarf signal levers	2	....	....	....	....	....	....	....	2	
Spare switch levers	2	2	....	....	1	....	....	....	5	
Spare traffic levers	....	....	....	4	4	....	....	....	8	
Spare spaces	37	7	15	24	12	....	....	....	...	
Lever frames	212	168	76	120	80	....	....	....	656	
Automatic signals	....	....	....	....	....	16	15	....	31	
Track circuits	79	58	11	41	6	12	16	32	255	

the charging circuit, preventing discharging of the battery. If the power returns after failing the relay restores the charging circuit.

Current for the lever locks of the interlocking machines is supplied from a 220 to 55-volt transformer, and the illuminated track diagram is fed from a 220 to 14, 12 and 10-volt transformer. If the alternating current fails an emergency switch will connect up the locks and the plants are then operated without the diagrams.

The Lake street plant receives power from three single-phase transformers, delta connected, located in the power house and furnishing 320 volts.

The range of voltages used in the complete installation is shown in the following list:

1. 6,600 volts alternating current, three-phase, power transmission.
2. 220 volts alternating current, three-phase, power secondaries.
3. 220-110 volts alternating current, three-wire tower lighting.
4. 110 volts alternating current, signal lighting.
5. 55 volts alternating current, locks and lights on levers.
6. 14-12-10 volts alternating current, lights on illuminated diagram.
7. 220-110 volts direct current, three-wire tower lighting.
8. 110 volts direct current, interlocking machine and telautographs.
9. 20 volts direct current, auxiliary circuit, emergency lever, locks and telephones and intercommunication systems.
10. 16 volts direct current, automatic signal operation.
11. 12 volts direct current, track circuit lights.
12. 1 volt direct current, individual track circuits.

INSTALLATION.

For the present needs and future requirements of the power distribution for signal, telephone and telegraph apparatus a system of ducts was installed. This starts at the power house with 32 and extends to a point near the junction of the north and west approaches, where a separation is made and each approach fitted with two lines of eight ducts each, one line on each side of the right-of-way as far as practicable. One line on each approach is for power and the other for signal, telephone and telegraph purposes. Separate manholes were built for each purpose except that the telephone and telegraph ducts open into the same manhole. Where the ducts had to run together three separate manholes were built, and the ducts for one apparatus run through the manhole assigned to the other two. Three-inch bituminized fiber conduit, laid in concrete, was used throughout. Across the subway approaches and extending 10 ft. on either side, a 4-in. iron pipe was run for each duct and the fiber put through it. The manholes are built of brick, with iron covers. Branch systems of conduits were installed for interlocking wires, following the same general type of construction as for the main line except that concrete junction boxes were built instead of manholes. Two-inch iron conduit is used for short runs. As a great many of the switches are on structural steelwork, the ducts were often laid in the concrete protection of the floors and the concrete junction boxes built as a part of the floor and the waterproofing made continuous up to and around them. Loricated tubing was used exclusively for wires and cables in the towers, and standard bushings and condulets were employed for branches and at ends. Three-inch and 4-in. yellow pine trunking was used where connections were made in wires as between junction boxes and manholes and switches and signals. Where more than six wires were run in one duct cables covered with a lead shield were employed. For the intercommunicating system double insulated wire and long cables of the telephone type were used, and for the power distribution the cables were made up of three No. 4 B. & S. copper conductors insulated with linen and covered with lead.

RAILWAY SIGNAL ASSOCIATION.

The sixteenth annual convention of this association was held at Colorado Springs, Colo., October 10, 11 and 12. A brief notice of the opening session was given in the *Railway Age Gazette* of last week, page 725, and the action of the meeting on the report of Committee No. 1, presenting a uniform scheme of signaling aspects, sending that report to letter ballot, was reported in the same issue, page 721. We should have said that the membership of the association had *decreased* during the past year; the total is now 1,237. The loss was mostly in junior members.

The principal speakers in favor of the report of committee No. 1 on aspects were: W. H. Elliott (N. Y. C.); C. E. Denny (L. S. & M. S.); J. C. Mock (M. C.); A. G. Shaver (C. R. I. & P.); J. H. Stadleman (Penn.). Messrs. Stevens (A. T. & S. F.) and Clausen (C. M. & St. P.) opposed the adoption of the report. After the report had been ordered sent to letter ballot, a motion was made to reconsider and refer the whole matter back to the committee; and even to change the composition of the committee, but this proposal was rejected by the meeting. Mr. Rudd, chairman of the committee which made the report, then offered the following resolution which was adopted by the meeting and ordered sent to letter ballot:

> Whereas, this convention has accepted and sent to letter ballot a scheme for a uniform system; and whereas, obviously such a system must differ in certain features from the present diverse practices, in order to attain uniformity; and whereas, the scheme submitted to letter ballot is the most feasible arrangement for attaining eventual uniformity;
>
> *Resolved*, that the acceptance of such a system does not and cannot discredit present good signal practices which have proved by twenty years of operation their safety and efficiency; and,
>
> *Resolved*, that the proposed scheme may safely be installed in conjunction with systems now in use without change of present systems; and,
>
> *Resolved*, that such [new] system should be used for new work and renewals so that in due and reasonable time uniformity may be attained.

The committee of this association appointed to act in conjunction with the committee on Relations of Railway operation to Legislation—the Melcher committee—is made up of C. E. Denney (L. S. & M. S.); W. J. Eck (Southern); J. A. Peabody (C. & N. W.); and A. G. Shaver (C. R. I. & P.).

The election of officers for the ensuing year resulted as follows: President, C. C. Anthony, assistant signal engineer, Pennsylvania R. R.; vice-president, F. P. Patenall (B. & O.); secretary-treasurer, C. C. Rosenberg, Bethlehem, Pa. New members of the Board of Direction: George Boyce (C. St. P. M. & O.); W. H. Higgins (C. of N. J.); G. S. Pflasterer (N. C. & St. L.); and M. E. Smith (D. L. & W.). Vice-president B. H. Mann holds over.

The place chosen for the next annual meeting is Quebec.

A portrait of the new president is given herewith. He needs no introduction to the members of the association nor to many of the readers of the *Railway Age Gazette*. He has been prominent in the activities of the association for a dozen years. He has been on the Pensylvania since 1896, previous to which he was in the signal department of the New York Central.

REPORTS AND DISCUSSIONS.

The committee on signaling practice and standards (No. 1, A. H. Rudd, chairman already noticed, in connection with aspects, also reported and recommended for adoption fifteen designs for signal parts, including blades for upper quadrant signals, details of vertical crank stands, transverse pipe carriers, spectacle clearance diagram, pipe insulation and a plunger lock. Revised drawings were also presented of semaphore spectacles, 1040 *B* and 1041 *B*.

The plans as recommended were adopted, except that in the plan for a semaphore bearing and a U bolt and clamp, the diameter of the bolt was made ¾ in. instead of ⅝ in.; and the plan for a mechanical dwarf signal was accepted only as a progress report.

Committee No. 1 also presented a revised code of symbols for use in signal drawings, plates 1 to 12. The committee during the past year has held four meetings at which symbols hereto-

fore in use were carefully considered, and revisions and additions suggested at the New York and Chicago meetings have been incorporated. The committee also recommended the adoption as standard, the specifications for 1-inch wrought iron signal pipe, published last year (drawing No. 1015).

The symbols were adopted as recommended, except that it was voted that a track battery should be designated by the letter *B* between the rails. The conclusion as to wrought iron signal pipe was adopted.

Committee No. 2 (C. J. Kelloway, chairman), mechanical interlocking, reported on four subjects, namely: bolt-lock for power operated home signals; concrete foundations; specifications for interlocking for drawbridges; and floor plans for mechanical interlocking cabins. The committee could not recommend a satisfactory device to take the place of a bolt-lock for power operated signals, but offered some suggestions on the subject. A code of specifications for Portland cement concrete was presented, the same having been approved by the harmonizing committee. Complete specifications for interlocking at drawbridges were deemed by the committee unnecessary, the general specifications for mechanical interlocking being adequate except for the special needs of drawbridges. These special needs vary with the types of bridge, and therefore it is not practicable to prepare satisfactory specifications; but the committee presented a list of requisites for the protection of drawbridges, including a statement of the sequence in which operations should be performed. It was recommended that the association take action with a view to having bridges so designed that rail locks may be easily applied near the ends of the rails, and rail attachments so arranged that rails may be readily insulated for track circuits.

Charles C. Anthony.

Plans of a cabin floor and of a lead-out floor were presented by this committee last June and are now in the hands of committee No. 1. The committee presented seven pages of proposed changes in detailed specifications for mechanical interlocking, the same having been approved by the harmonizing committee (the chairmen of committees 2, 3 and 4).

Discussion.—The discussion on the question of a substitute for the bolt lock resulted in referring it back to the committee. The specifications for concrete were approved, except that for foundations which are not made in place, such as those for pipe carriers, the mixture should be stronger; and this change was incorporated in the report as adopted. The recommendations as to drawbridges were adopted and sent to letter ballot, as were the recommendations of the harmonizing committee.

Committee No. 3 (B. H. Mann, chairman), power interlocking, submitted typical plans for electric interlocking; a report on a bolt lock, or its equivalent, and specifications and typical plans for electro-pneumatic interlocking. Much of the matter in this committee's report consists of things presented at the June meeting, but now in more complete shape. Figs. 10 and 11, of plans presented last June, have been withdrawn. The plans presented now are Figs. 8, 9, 12, 13 and 14; approach and route locking with and without slotted signals; simple route locking; track indicating circuit; and simple approach locking. The committee proposes definitions of "detector locking," "route locking" and "approach locking." Taking up the question of specifications for motors to be used for the operation of switches and signals, the committee consulted F. W. Ells, of Milwaukee, and presents a code of specifications prepared by him.

The foregoing matter was prepared by a sub-committee, W. H. Arkenburgh, chairman. Another sub-committee, F. B. Weigand, chairman, prepared diagrams of typical plans for electric interlocking, including circuits for one-arm signals and circuits for selecting signals. These diagrams number 39; 7 based on the practice of the American Railway Signal Company; 9 the Federal Signal Company; 12 the General Railway Signal Company; 9 the Union Switch & Signal Company, and 2 the electro-pneumatic system of the Union Company. This list includes the single switch circuits presented last year, but with new numbers.

Committee No. 3, like committee No. 2, was directed to report on a bolt lock for electric signals. The sub-committee presented a brief report describing such an apparatus which is in experimental use on the Pennsylvania Lines west of Pittsburgh, at SQ tower, Pittsburgh. This lock is solenoid, which when de-energized allows a plunger to drop into a hole drilled through the slide plate and base of the switch movement. The committee describes the operation of the lock; but, after consulting 24 signal engineers by letter, and after careful study, concludes that such an additional safeguard is not needed on the standard types of electric interlocking. The safeguards now in use afford as much security as is afforded by the bolt lock in mechanical apparatus; and where additional protection is desired for high speed routes, the sub-committee recommends the installation of route locking. The proposed bolt lock would of course be useful if by its introduction expense could be saved by the elimination of safeguards against crosses in the circuits.

Discussion.—The five diagrams, Figs. 8, 9, 12, 13 and 14, were accepted and sent to letter ballot, as were the 39 plans submitted by Mr. Wiegand. The matter prepared by Mr. Ells was accepted as information.

That part of the report of committee No. 3, dealing with the question of bolt locks, was accepted as a progress report.

Sub-committee C (I. S. Raymer, chairman), of committee No. 3, submitted a code of specifications for petroleum asphaltum suitable for insulating electric conductors in trunking. This committee also submitted plans for terminal boxes, junction boxes and trunking; and also plans of circuits for single switches, cross-overs and signals interlocked by the electro-pneumatic system.

The specifications for asphaltum were approved by the con-

vention. The plans for terminal boxes, etc., and for electric circuits, etc., were accepted and ordered sent to letter ballot.

Sub-committee E (W. F. Follett, chairman), submitted a code of specifications for electro-pneumatic interlocking, filling 40 pages. This code includes specifications for gas engines, for electric generators, for switchboards, for bonding pins, zincs, coppers and copper-sulphate; and supplementary specifications for drawbridges.

Committee No. 3 reported the conclusions of the harmonizing committee on eight pages of additions and changes in the specifications for power interlocking.

Discussion.—The specifications submitted by sub-committee E were adopted, except that the length of detector bars was left blank and the specifications for drawbridges were not acted on. The recommendations of the harmonizing committee were adopted.

Committee No. 4 (A. G. Shaver, chairman), automatic block signals, reported a complete code of specifications for direct current neutral relays; specifications for impregnation treatment of magnet coils; specifications for hard fiber and for tinned channel pins. Former specifications have been clarified. The committee has under consideration a specification for coppered pins and a design for a channel pin gage. The battery specifications include drawings of a cell, a zinc and a copper; also of cross arms for four, six, eight and ten pins.

The committee was unable, for lack of time, to present typical circuit plans.

Discussion.—The specifications for impregnation treatment of coils, etc., for hard fiber and for channel pins were approved, as was the plan for a caustic soda cell; but the specifications for the cell were referred back. The plans and specifications for zincs and for cross-arms were approved.

The committee on automatic stops and cab signals (No. 6, Robert C. Johnson, chairman), reported that it had examined the plans and specifications of a number of systems during the past year and had witnessed some tests; but it makes no recommendations. Some railways have started investigations, by their own officers, of the subject of automatic stops and cab signals, but the names of these railways are not given. Reference is made to the last annual report of the Block Signal & Train Control Board and its essays on train brakes and track circuits. Brief mention is made of three systems by name, the Collard-Rohe, the Unverricht and the system which has been tried on the Interborough Rapid Transit and which was described by Mr. Waldron at the last meeting of the association.

This was received by the association as a progress report.

The committee on subjects and definitions (C. C. Anthony, chairman), made a number of recommendations looking to the adoption of definitions for certain kinds of electric locking and for a number of electrical terms.

The meeting approved the proposal of the committee that when, on a letter ballot, a member disapproves a definition, he shall be asked to say whether he objects to the term itself or to the committee's way of defining it.

The committee on wires and cables (No. 9, W. H. Elliott, chairman), reported codes of specifications for lead covered cable, for underground braided cable, for underground lead-covered cable for currents of 2,200 volts, for copper-clad steel bond wire and for hard-drawn copper steel line wire of 30 per cent. conductivity.

The committee unanimously recommends that the resistance table for rubber insulated wire, which was presented last year, but withdrawn at the request of the manufacturers, be now adopted, the manufacturers having failed to substantiate the objections which they then made. Practically all of the wire which has been bought by railways during the past year has been of higher insulation resistance than is now recommended by the committee, and several of the largest manufacturers have given assurance that they do not object to the severer specifications now proposed. The table of resistances as proposed is to apply to rubber insulated signal wire, aerial braided cable and rubber insulated lead-covered submarine cable.

Discussion.—The first three codes of specifications above mentioned were adopted, but those for copper-clad bond and line wires were not adopted. The recommendation as to the table of resistances was adopted.

Committee No. 10, on electric signaling for electric railways (H. S. Balliet, chairman), made a report filling sixty pages, made up mainly of descriptions of the latest installations of automatic signals on railways, standard or interurban, on which electric traction is to be used. The work was divided among eight sub-committees, composed of ten or more men each. The following are the plants described: Philadelphia, Baltimore & Washington at Washington, D. C. (described in the *Railway Age Gazette* of June 30, last); Atchison, Topeka & Santa Fe, Holliday, Kans. (12 miles) and Daggett, Cal. (21 miles); Cumberland Valley, 56 miles; Auburn & Northern and Syracuse, Lake Shore & Northern (these last two installations, aggregating about ten miles, were put in by the Union Switch & Signal Company in 1908 and 1909); Southern Pacific at Oakland, Cal., 18 miles of road and 17 interlocking plants; Washington Water Power Company, 20 miles (described in the *Railway Age Gazette* of December 16, 1910); Boston & Maine (Hoosac Tunnel), 10 miles completed this year; and Illinois Traction System, 100 miles, completed this year. Description of the signaling of the New York Terminal of the Pennsylvania Railroad was considered, but the report on it is deferred until next year. Mr. Morrison, of the New Haven road, was requested to describe a system of alternating current automatic block signals for a railway using alternating current for propulsion. He made a drawing of such an arrangement, and it is presented by the committee as a "suggestion," but because the art is not sufficiently advanced no list of requisites for apparatus or material is presented.

Another sub-committee presents a description of the General Railway Signal Company's universal polyphase relay.

Sub-committee B (E. B. Smith, chairman), presents a list of requisites of apparatus and material for automatic block signals worked by alternating current on a line where direct current is used for propulsion. The full membership of committee No. 10 endorses Mr. Smith's report, this after having made a searching and rigid examination of a large amount of data.

Discussion.—The bulk of the matter in the report of committee No. 10 was received as information, but the diagram of circuits for an alternating current block signal system on a railway using A C propulsion, as presented by Mr. Morrison, was adopted, the same having been approved by the whole committee. The same was true of the matter presented by sub-committee B.

The committee on the manual of standard practice (No. 11, F. P. Patenall, chairman), made a report setting forth the standards of practice which it was believed should be printed in the Manual of the association. Most of these standards have been printed in past volumes of proceedings, principally since January, 1909, but the voluminous codes of specifications for mechanical interlocking, for electric interlocking and for automatic block signaling will require some slight revisions. These revisions the committee proposes to make. The committee says that the following items should *not* be printed in the Manual, being now out of date: (1) all special papers; (2) former reports on symbols and nomenclature; (3) rules for operation and maintenance of interlocking, and (4) signal department organization.

Discussion.—The meeting voted not to include in the manual the third principle under the head of signal indications, namely: "Two lights of full intensity shall be displayed on every high speed signal." The recommendations of the committee as to omissions were accepted.

The committee on contracts (No. 12, L. R. Clausen, chairman), presented a long discussion of the considerations to be taken into account in the preparation of a contract for the joint construction, operation and maintenance of an interlocking plant (as at the crossing of two roads), but it was found imprac-

ticable to submit a form of contract or agreement suitable for adoption as a standard, owing to the great variety of circumstances which it is necessary to consider. The discussion presented by the committee includes three distinct lists of items of expenses and responsibility: (a) where there is no existing crossing; (b) where there is a crossing but no plant; and (c) where there is a crossing with a plant.

This report was received as information and ordered printed in the proceedings.

The committee on the promotion of signaling education (W. J. Eck, chairman), reported that the index to signal literature had been under consideration during the past year, but that there is no occasion for the revision of that index at the present time. None of the colleges or universities have made material changes in their courses of study during the past year. The committee has made a careful investigation of The School of Railway Signaling at Utica, N. Y., which now has about 900 students receiving instruction by correspondence. The school has established a free employment bureau. The courses of study have been re-arranged so as better to meet the needs and wishes of students who are already engaged in signal work and who desire to take up some of the features of signal engineering while still they are engaged in elementary studies. The committee believes that the school is doing the greatest work for the signal world that was ever undertaken.

Eighteen pages of this report are taken up with notes on what a number of the principal railways are doing in the matter of educating their signal department employees. The note on the Delaware, Lackawanna & Western includes seven pages, containing extracts from the rules prescribed by that company for maintainers. The educational department of the Union Pacific now prescribes 33 lessons on signaling. Two-thirds of the maintainers on that road are studying these lessons.

This report was accepted substantially as presented.

The committee on storage battery (A. H. Yocum, chairman), reported a code of specifications for portable cells for all-lead storage batteries, with drawings. The committee finds that a jelly electrolyte is in use by some of the members of the association, but the committee has not been able to get satisfactory data for a specification.

These specifications were a revision of those heretofore in effect, and were adopted by the association as reported.

The committee on methods of recording signal failures (J. C. Young, chairman), reported seven proposed standard forms for reports and records. The forms considered by the association last year have not been used by any railway; but the committee has made a careful study of the whole subject and has unanimously agreed on the forms now presented. The first one is a card to be filled out by an engineman when delayed by a signal; the next is a train despatcher's record, to be kept in a book 7½ in. x 12 in.; the third is a form of telegram to be sent by the despatcher to the maintainer; the fourth is the maintainer's failure report; the fifth is a record of the performance of each signal, to be kept up throughout the life of the signal; and the sixth and seventh are monthly summaries. Form six shows the comparative efficiency of the different maintainers and is designed to stimulate competition between them. This form includes not only automatic signal failures, but every kind of signal failure with which the maintainer has to do. The committee find that the methods of compiling and classifying monthly statements are exceedingly diverse, hardly any two railways in the country making reports exactly alike.

The meeting would not take the time to discuss this report and referred the subject back to the committee for further investigation.

According to the statement of the director general of railways of Argentina the narrow-gage lines produced $18,669,890 and spent $13,647,995 during 1910. The medium-gage lines produced $4,356,975 and expended $2,541,810. The wide-gage railways produced $80,049,545 and expended $45,326,050.

PUBLIC REGULATION AND RAILWAY SAFETY.*

BY SAMUEL O. DUNN,

Editor, *Railway Age Gazette.*

No railway men are engaged in more useful work than the members of this association. Operating officers in general are striving to increase the economy and efficiency of transportation in this country. You are doing that, and in addition you are devoting yourselves especially to increasing the safety of transportation. There is no more acute need on our railways than work along that line. Their accident record often is exaggerated. The causes of it often are misrepresented. But after all proper allowance has been made for exaggeration and misrepresentation, the dispiriting fact remains that the record is bad. Some people think the primary duty of a railway is to furnish cheap transportation. I think its primary duty is to provide good and safe transportation. The public has no right to criticize the very great majority of the rates of our railways. On the average they are low—too low. The public has a right to criticize their accident record. Not only does it possess that right, but it is using it. The public opinion on this subject which is developing demands the earnest attention of all who wish our railways well. We have but to glance over the history of the last few years to be instructed that when the public begins to turn its attention to any abuse or evil condition in the transportation business it behooves railway men to begin at once to study the situation, to undertake to remedy it, and, if it is not completely remediable, to lay the facts before the public so that it may not act unwisely.

Until a few years ago the traffic men of our railways enjoyed much freedom of action. If you and I had been in their places probably we, being weak and erring human beings like them, would have done as they did—that is, abused this freedom. Ever since 1887 it has been illegal to discriminate unfairly between persons or communities. Nevertheless, long after that secret rebating and other forms of unfair discrimination continued. The railway traffic men were not alone at fault. The shippers who persisted in contempt of the law to solicit and demand illegal favors, the lawmakers who made the law inconsistent, the public officials who did not enforce it, were also much to blame. But the public held the railway traffic men entirely responsible, and when it got through with them they had been lassoed, thrown, tied and branded. The brand they bear is I. C. C., meaning they are now owned by the Interstate Commerce Commission. Nominally, the railway traffic managers can still make rates. Actually, almost all power to make them has been parceled out between the state and interstate commissions.

Having finished the job of taking control of the rates and earnings of the railways, those who regulate you recently have been turning their attention to the operating department. They are prohibiting public drinking cups on trains, fixing the number of men who shall compose a train crew, prescribing safety appliances and the kind of headlights that shall be used, and so on. It is proposed in Congress to require the railways to widen their clearances, to within a few years substitute steel for wooden passenger train equipment, and to install block signals on all their lines—changes Mr. Melcher estimates would involve an expenditure of $1,361,000,000. If there could be any assurance that legislation and the orders of the commissions dealing with these subjects would be wise, railway men could regard them with complacency; they could continue to draw their salaries and let the regulating authorities assume the responsibility and do the work of seeing that the railways are well operated. Unfortunately, experience does not encourage this view.

I have already said that inconsistency in the laws for the regulation of rates was largely responsible for the long continuance of unfair discrimination. This inconsistency existed in the original Interstate Commerce act itself. It said in one

*An address delivered at the dinner of the Railway Signal Association, Colorado Springs, Colo., October 11, 1911.

breath that the railways should not unfairly discriminate; it said in the next that they must quit pooling. On top of that the Supreme Court of the United States held that the Sherman anti-trust law prohibited even reasonable agreements between competing railways regarding rates. Now, the chief purpose for which pools had been formed and agreements made was to enable the railways to keep competition within reasonable bounds, so as not only to protect their own earnings, but to eliminate the unfair discrimination prohibited by the Interstate Commerce act. Where railway competition goes on without restraint, unfair discrimination is inevitable, for the railways will naturally compete harder for the business of the big shipper and the big community than for the business of the little shipper and the little community, which results in their extending to the big shipper and big community favors they do not give to the little shipper and the little community. In spite of the fact that this inconsistency in the provisions regulating railway traffic has existed for twenty-four years, in spite of the fact that lawyers and courts repeatedly have pointed it out, that railway men have complained of it, that every economist of note in this country has condemned it, Congress has refused to take any action to release the railway traffic man from an intolerable position where he must either violate the provisions that prohibit agreements and pools, or violate the provisions that prohibit discrimination.

Railway managers cannot, however, escape all responsibility for unwise legislation regarding traffic. If, when President Roosevelt asked for legislation empowering the Interstate Commerce Commission to fix reasonable rates when it found rates made by the railways unreasonable, railway managers had consented not to oppose it, very probably they could have written the measure themselves. The commission ought to have been given this power, but most railway executives opposed it. The consequence was the raising of a great storm of public agitation which not only carried through the proposed legislation, but so aroused public opinion as to cause the enactment of a great mass of federal and state laws which ought not to have been passed.

The application of all this to the situation that confronts railway operating officers is plain. First, the conditions that may suggest the need for regulation of operation should be remedied by railway men themselves as far as may be practicable. The best way to prevent regulation is to remove all reason or pretext for it. Then no effort should be spared by railway men to so educate the public and so advise the regulating authorities as to prevent unnecessary regulation and to see that such regulation as may be adopted shall be wise. The most important legislation regulating the operating department that may be passed is that aiming to promote safety. Because the accident records of our railways is open to criticism, there are many persons, having boundless confidence not only in the power, but in the wisdom of government, and having no great confidence in railway officers, who seem to think that the government should prescribe the safety devices and measures to be adopted without any particular reference to the views or wishes of railways. But it is questionable if the respective records of our governments and our railway managements warrant such complete confidence in the governments or such complete want of it in the railway managements. The total number of people killed in railway accidents in the United States in the year ended June 30, 1909, the last year for which we have complete statistics of the Interstate Commerce Commission, was 8,722. Of these, 4,944, or 57 per cent., were persons who met death while trespassing on railway property. Their deaths were due, not to shortcomings of railway management, but to shortcomings of government. The states have constantly refused to pass and enforce laws to prevent such trespassing, although repeatedly urged to do so. The total number of deaths, aside from those of trespassers, was 3,778. This is the maximum number that may properly be charged against shortcomings of railway managements, railway plants and railway employees. The primary, fundamental duty of every civilized government is to protect men from acts of violence by other men. Yet, according to statistics compiled by the Chicago *Tribune*, the number of persons who have died by homicide in the United States in a single year have exceeded 10,000, and were no less than 8,975 in 1910. The railways have over a million and a half employees, most of whom are constantly engaged in work which must be extra hazardous under the most favorable conditions. They haul each year over 900,000,000 passengers an average of 33 miles each, which is the equivalent of hauling each of our population about three hundred miles. And yet the railways kill but 2,358 employees and 249 passengers, a total of 2,607 persons, or but 29 per cent. as many as meet death by violence at the hands of their fellows. Those who work for railways and those who travel are very much more likely to be killed by their neighbors than to be killed while about their ordinary work or while traveling. Even the total number of persons killed in all railway accidents, including trespassers on railway property, was less than the number who died by homicide. These figures do not indicate that the efficiency of government in the United States is so much greater than the efficiency of railway management as to justify public officials, and the public who are responsible for the character of our governments, in pointing the finger of scorn at railway managers, and stepping in to tell them how to make railway transportation safer. The streets of Jerusalem, we are told, were kept clean by every man sweeping before his own door. Perhaps if our governments would perform better such fundamental duties as that of protecting men in their right to security of person and property from the violence of their fellows and devote less energy to regulating railways there would be fewer homicides and no more railway accidents. One trouble with government in the United States is that we have so many public officials who devote time to instructing and guiding other persons in the performance of their duties which would be better spent in performing their own. There is a popular impression, for example, that our governors are elected to enforce state laws, whereas recent developments indicate that they conceive it to be their job to act as the guides, counselors and friends of the Supreme Court of the United States in deciding railway rate cases. I have heard the accident record of our railways used as an argument for government ownership of railways. The same sort of boneheaded logic would lead to the conclusion that our homicide record is a conclusive argument in favor of railway ownership of government.

What I have said is not intended as an argument against all regulation of railway operation. It is meant only to call attention to the fact that our governments perform even those duties which are primary and fundamental, and which civilized governments have had thousands of years of experience in performing, with much less than 100 per cent. efficiency. If they do not perform these duties nearly so well as could be wished, it seems a just conclusion that their officers should be very moderate in their criticisms of railway management, and that they are not apt to perform well other duties that are new and strange unless they hear and heed the counsel of those most familiar with the subjects to be dealt with. Not only should railway operating men place the results of their experience at the disposal of public authorities, but they are willing and anxious to do so. The special committee on the Relations of Railway Operation to Legislation, of which Mr. Melcher, vice-president of the Rock Island Lines, is chairman, has been doing excellent work along this line, and is prepared to do more. At the meeting of this convention a committee of signal officers has been appointed to act as expert advisers on signal matters to Mr. Melcher's committee. I believe that when lawmakers and public officers understand the motives that prompt the special committee and its auxiliary committees, and the methods according to which they work—methods that have not a single characteristic of those of the old-time railway lobby—they will

be welcomed as invaluable counselors in determining what laws ought and what laws ought not to be passed, and how those that are passed ought to be framed.

The need for such co-operation between railway men and public authorities has been strikingly illustrated by many incidents that have occurred in connection with the regulation of operation. For example, the management of a large road whose financial resources are limited some time ago made a careful study of how to so spend the money it had available for block signals as to get the maximum results. It decided that, as most accidents take place at and near stations, it would first protect the stations on its lines. It had just got well started on this work when the state of Indiana required railways having certain earnings per mile to equip all their lines in that state with block signals. The consequence is that this road is spending all of the money it has available for signals in Indiana, and instead of getting and giving to the public the maximum protection for its expenditure it is getting and giving to the public the minimum protection. Such incidents are bound to happen if regulating authorities act without the advice of those experienced in railway operation or in disregard of their recommendations.

This incident also directs attention to another and most important point. There is no doubt of the right and power of the public to regulate railway operation in the interest of public safety. But it has no right to regulate it regardless of the effect on railway earnings. Indeed, it may be questioned whether, if public authorities would let the roads enjoy ample earnings, much regulation specifically to promote safety would be necessary. Railway managers are as anxious to make railway operation safe as the public is to have them do so. When they have the needful funds they commonly use them to further the public's welfare as well as that of the roads. If you will cast your mind's eye over the railways of this country you will find that generally the roads that have the most complete and the best block signal systems, which have the safest equipment and the safest roadway, are the most prosperous roads, and that it is the least prosperous that are the most unsafe. A public policy of dealing penuriously with the carriers tends much more strongly to prevent the promotion of safety than the most unjustly criticized efforts of railway officers to pay substantial dividends—dividends which must be paid if they are to raise capital on reasonable terms. This penurious policy is doing far more to prevent the general installation of block signals and other safety devices than regulation is doing, or perhaps can do, to promote it. When people compare the accidents on our railways with those on the railways of the principal countries of Europe they should bear in mind that the railways of those countries have been made safer than ours by the enforcement of sterner discipline of employees—discipline which is backed up by the administration of stringent laws penalizing the violation of rules of the railway companies—and also by a capital investment per mile exceeding that of our railways by from 100 to 400 per cent. Our railways are capitalized at less than $60,000 per mile. Those of Europe are capitalized at an average of twice this much, and those of the United Kingdom, where accidents are fewest, are capitalized at about $275,000 a mile. In those parts of our country where the investment in railways is as great as the average in Europe, travel is much safer than elsewhere. And when the earnings of the rest of our railways are large enough to enable them to raise the capital to develop their facilities as their managers would like to do, you will, I believe, see them made equally safe, whether there is any government regulation of operation or not.

In this respect, as in all others, the duties of the public and the railways are reciprocal. It is the duty of the railways to make their service good and safe; and assuming that they have the means to do so the government has a right to require them to do so. On the other hand, the government has no right to act in ignorance or disregard of the conditions to be dealt with, as they are known only to those who are dealing with them. It has no right to regulate the earnings of railways without any regard to the effect that must be produced on the quality and safety of their service, and, equally, it has no right to regulate their service without due regard to the effects on their revenues. No class of men, whether inside or outside of railway service, is better situated or better equipped to give the public and the regulating authorities the kind of knowledge and counsel that they need, if there is to be further regulation regarding safety, than the members of the Railway Signal Association; and in proportion as you do diffuse correct knowledge and give wise counsel on this subject you will earn the gratitude of both the railways and the people.

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS.

This association held its twenty-third annual convention in Washington, D. C., October 10-13. The opening addresses of President Burr, and of Chairman Clements of the Interstate Commerce Commission, were noticed in these columns last week.

The following states were represented by one or more persons, in most cases a commissioner, and generally two, but in some cases a secretary or counsel: Arizona, Arkansas, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York (First and Second districts), North Dakota, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Virginia and Wisconsin. Mr. Cartwright, secretary of the Railway Commission of Canada, was present.

The whole of the time of the convention during the first day was practically taken up by a discussion of the report of the committee on express service and express rates, presented by Chairman Staples of Minnesota. The president of the association, Mr. Burr, in his address, advocated a law requiring the railways to attend to the parcels traffic themselves instead of having it done by the express companies. The discussion brought out a great variety of expressions of opinion, and it was carried over to the second day. The committee, indeed, offered no final conclusions, declaring that the subject should be studied another year. Mr. Decker of New York and Chairman Clements of the Interstate Commerce Commission, members of this committee, had not agreed to all the radical propositions of the majority, and each presented to the association a memorandum setting forth their views.

On Tuesday the association adopted a modified resolution approving the action of the House of Governors in the appointment of a committee of five to file with the Supreme Court of the United States a brief in the Minnesota rate case, "to the end that these cases, so far as the same affect the several states, may be fully presented to the Supreme Court."

The committee on legislation made a report calling upon Congress to give to the Interstate Commerce Commission additional powers. This committee believes that railway rates and the issue of railway securities can be regulated with such a high degree of scientific accuracy that railway securities generally will some time become as safe as government bonds.

A resolution was adopted declaring that no injunction ought to be granted by a United States court to stay the enforcement of any order "made by a commission authorized by state laws to regulate or control common carriers or other public service corporations."

The association selected Washington for its next annual convention. The bid of Detroit, Mich., for the convention was defeated, 19 to 28. The date of the next meeting is November 19, 1912.

The election of officers for the ensuing year resulted in the choice of the following: President, Charles F. Staples of Minnesota; first vice-president, O. P. Gothlin of Ohio; second vice-president, H. W. Hill of Georgia, and secretary, William H. Connolly (Interstate Commerce Commission) Washington, D. C.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XXI.

Tucson, Ariz., August 26, 1911.

My Dear Boy:—If people's eyes were never too large for their stomachs there would be less overeating. If human concepts were never too vast for practical performance there would be fewer disappointments in administration. Because the railways have grown so fast and have become so large, our imagination has sometimes run too far ahead of our judgment. This is a big world full of big things and big men. The biggest men are learning that big things can be handled and big men developed only by complete treatment of little things and of the so-called little men. This growing conviction is manifesting itself in various ways. Railways, thank God, are building more division shops and relatively fewer general shops. Division stores are becoming more and more complete. Division accounting is gaining ground and is paving the way for local disbursement.

The station agent, bless him, is being emancipated by the telephone from specialized selection, and is gradually being accorded that recognition which is his due as an all 'round man. In short, our big corporate units are growing in strength only as the smaller units become complete and self-contained. Official solicitude should be for ton-miles, as well as for train-miles, for car-loads as well as for train-loads. Take care of the mills and the millions will take care of themselves. Above all, study an often neglected unit, the man-day. How much work can each man reasonably be expected to perform in one day? How many days in each year can a man reasonably expect to be employed? Labor conditions on railways will never be satisfactory until employment can be reasonably constant and continuous. This is a difficult problem, but when enough big men give it attention it will be solved. It probably means more elasticity, more interchangeability between train service and the various kinds of maintenance, between the locomotive and the shop, between the railway and allied or contiguous industries. The individual is the indivisible unit of society. We must build from him as a unit. Since he is of such infinite variety it follows that our sociological architecture must be varied accordingly. Design is staff work. Execution is line work. I do not doubt the ability of one man to direct the carrying out of a scheme practically designed. When one man tells me that unassisted he can furnish a design to meet all requirements I am from beyond Missouri and have to be shown several times.

I have been writing you all these things because of interest in you and pride in our profession. With four or five other professions and occupations at command, I stick to the railway game because it is the greatest of ancient or modern times. If these letters, written hurriedly in the midst of a strenuous life, with little opportunity for revision and verification, have hurt anyone's feelings, I am sorry. Many things in this world are taken too personally and too seriously when intended as only Pickwickian.

If these letters have helped you or any friend of yours, by shattering any false idol or otherwise, they have more than fulfilled their purpose. Those to whom fortune has been kind in affording extended opportunities owe to society the duty of imparting their conclusions to their fellows. The recipients alone are qualified to judge as to how well such duty is performed and as to how far such conclusions are worth while. In this case the duty has been a pleasure as well.

To avoid the switch shanty garrulousness of an old brakeman I now give up this preferred run and turn in at the office my lantern and keys.

With a father's blessing,

Affectionately, your own

D. A. D.

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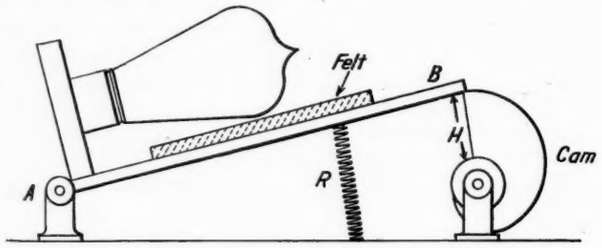
ELECTRIC LAMP TESTING DEVICE.

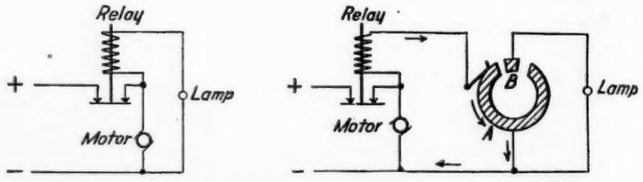
A method for testing the metallic filament lamps, which was devised by Mr. Vinson, an engineer of the Western Railway of France, is shown in the accompanying illustrations. The device is used to give the lamps repeated shocks, so as to test the strength of the metallic filament. As shown in the illustration, the lamp is placed on a pivoted board *A B*, which is raised by a cam and allowed to fall through the distance *H*. A spring *R*, whose tension may be regulated, is used to increase the force of the fall; a felt strip is placed on the board directly to deaden the shock. The cam is driven by an electric motor which operates at 60 r. p. m., and the number of revolutions or shocks are



Device for Testing Electric Lamp Filaments.

registered on a revolution counter. The motor connections are arranged so that when the filament breaks the motor will stop, the counter showing the number of revolutions which it took to break it.

The lamps are tested both cold and hot; the wiring diagrams show the way in which the motor is connected. When testing the lighted lamp the connections are quite simple, the lamp being placed in shunt across the motor. In this shunt is a relay, which controls the master switch to the motor. When the filament of the lamp breaks, the relay circuit or the shunt will be broken, allowing the master switch to drop, thus stopping the motor. To test the lamp cold, the connections are a little more complicated. A rotary switch is provided in the shunt circuit, as shown, the



Wiring Diagrams for Testing the Lamp Filament Hot and Cold.

lamp being conected to the small segment *B*. As the switch revolves, in the direction shown, the brush remains for the most part on the section *A*, which provides a direct connection through the shunt. During the revolution, the brush will come in contact with the segment *B*, which passes the shunt current through the lamp. If the lamp is not broken it will be momentarily lighted by the current passing through it, but this does not raise the temperature of the lamp to any appreciable extent. When the lamp breaks and the brush comes in contact with the segment *B* the relay circuit is open and the master switch falls, thus stopping the motor.

FOREIGN RAILWAY NOTES.

Crop prospects reported from all parts of Argentine are excellent. The railways have in consequence made appropriations and are in a state of efficiency for meeting the coming harvest.

The Danish State Railways raised their passenger fares October 1. The advance is greater in proportion for the longer journeys than for the short ones, in a few cases as much as 40 per cent.

NEW RAILWAY LAWS IN CALIFORNIA.

At a special election, October 10, called by the governor for the purpose the citizens of California voted on 23 proposed amendments to the state constitution. These were passed by the last legislature, as reported in the *Railway Age Gazette,* April 7, last. The following sections affecting the railways were adopted by the people:

1. (Senate No. 17).—Adding to Section 14, of Article 1, the rights of private property, and to the law of eminent domain. The taking of private property for a railway, either steam or electric, for logging or lumbering purposes shall be deemed a taking for public use. Any person, firm, company or corporation, taking private property under the law of eminent domain for such purposes, shall thereupon become a common carrier.

2. (Senate No. 32).—Adding to Article 20, a new section to be numbered Section 21, relating to compensation for industrial accidents. The legislature is empowered to enforce a liability on the part of all employers to compensate their employees for any injury incurred in the course of their employment, irrespective of the fault of either party. The legislature may provide for the settlement of any disputes arising from such proposed legislation by arbitration, or by an industrial accident board, by the courts, or by any or all of these agencies, anything in the state constitution to the contrary notwithstanding.

3. (Senate No. 47).—Amending Section 23, of Article 12, to confer upon the railway commission power and jurisdiction to regulate and control the business of all public utilities.

4. (Assembly No. 6).—Amending Section 22, of Article 12, to create a railway commission, and define its powers and duties. There will be five commissioners instead of three. The legislature may district the state and the commission receives plenary powers.

The three commissioners in office at the time this section takes effect are to serve out the term for which they were elected, and two additional commissioners are to be appointed by the governor. The commissioners first appointed hereunder shall serve; one, until January 1, 1917; two, until January 1, 1919, and two until January 1, 1921. The legislature shall have the power, by a two-thirds vote of each house, to remove any one or more commissioners from office for dereliction of duty or corruption or incompetency.

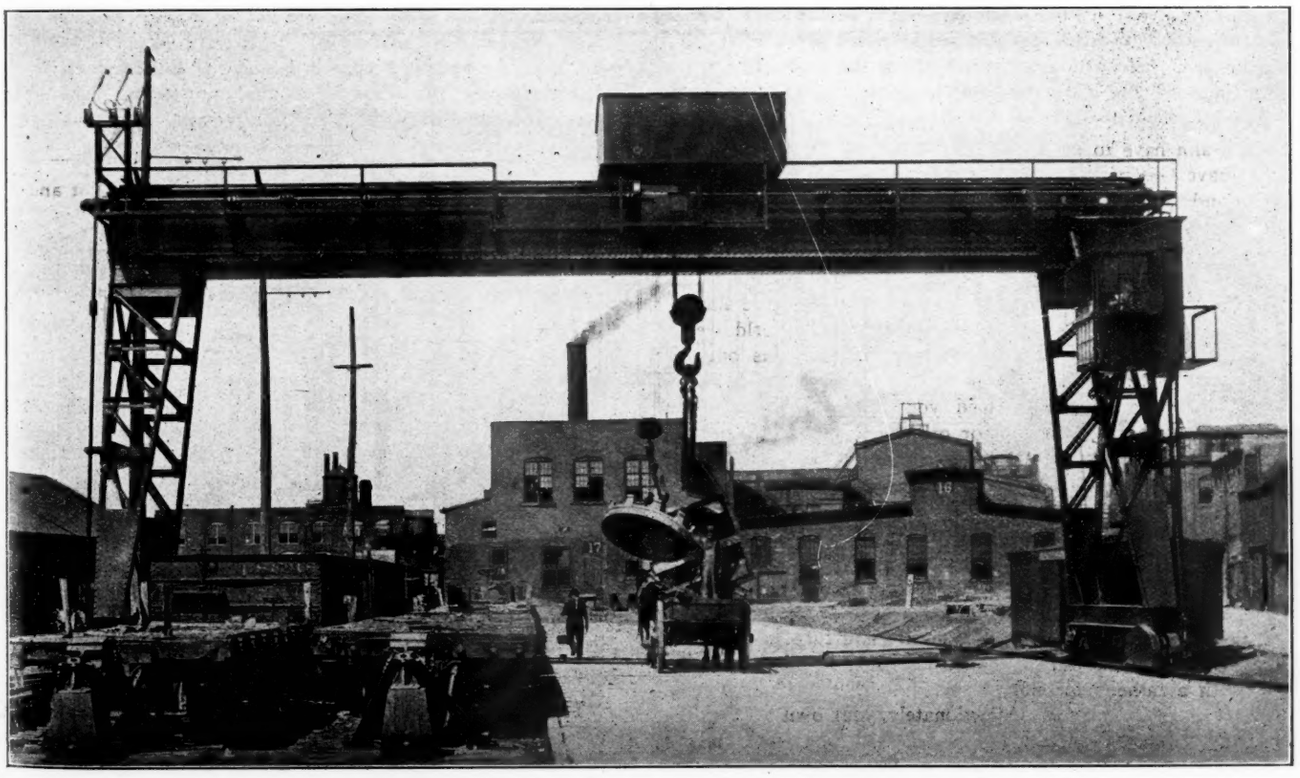
5. (Assembly No. 28).—Amending Section 19, of Article 12, relating to the issuing of passes to public officials. No transportation company shall grant free passes, or passes or tickets at a discount, to any person holding any office of honor, trust or profit in the state, except to members of the railway commission and officers and employees of the commission and to peace officers. The acceptance of any such by other than those named shall work a forfeiture of office. [This appears to be the only action taken concerning passes.]

6. (Assembly No. 50).—Amending Sections 20 and 21, of Article 12. Advances in rates cannot be made without permission of commission; discrimination is prohibited, and except by commission's permission the charge for a long haul shall not exceed the charge for the aggregate short hauls over the same distance; and the commission may authorize a lesser charge for a long than for a shorter haul. This power to fix absolute rates is not to be subject to review by the courts, except on a question of confiscation. The commisison is to have the power to require one railway company to switch to private tracks of shippers upon its own line, the cars of a connecting railway, and to regulate compensation for such service.

SELF-PROPELLED GANTRY CRANE.

The gantry crane shown in the accompanying illustration has recently been installed in the Cleveland yards of the Lake Shore & Michigan Southern by the Cleveland Crane & Engineering Company, Wickliffe, Ohio. It has two hoists, the auxiliary hoist being rated at five tons and the main hoist at thirty tons capacity. Each one of these hoists is capable of 50 per cent. overload. The span of the crane is 64 ft. and the height 30 ft. It covers two sidings, which accommodate six freight cars each. There is also wide space for teaming trucks to drive under the crane near the sidings.

The crane is operated by electricity and a 25 h. p. motor



64-ft. Gantry Crane; Lake Shore & Michigan Southern.

is located at the middle of the bridge. The motor shaft is geared to the axles of the two front trucks, there being in all four trucks of two wheels each. By this means the crane is propelled along the track. On the bridge is an enclosed four-wheeled trolley which accommodates three motors of different sizes—one for each hoist and the third for the rack which drives the trolley along the bridge. The operator's cab is heavily enclosed, and contains the controllers for all the motors and the brake.

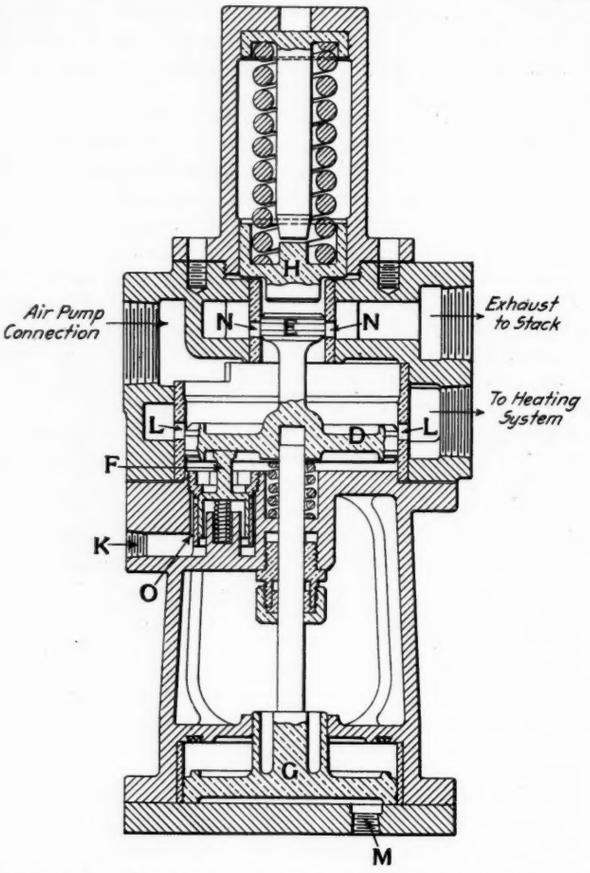
This crane replaces a stiff leg hand crane of 15-tons capacity. The radius of the boom permitted its operation over four cars. To unload more than this number the assistance of a switch engine was necessary. One operator was employed for the crane and a foreman with five assistants for moving loads weighing over 15 tons, as they required the use of rollers and crowbars. This required considerable extra time and additional labor, especially during the rush periods. With the new method one operator is required, but no assistants, since but one man is needed to attach the hoist to the load, and this is done by the one who comes for the load. The new crane operates over twelve cars, which saves much time and the services of a switch engine and a yard crew. The handling of the load by the new method also requires only about one-third the time.

This gantry crane has handled thirteen heavy loads in twenty minutes, whereas the old stiff leg crane, with a crew of six men, could hardly have accomplished the same job in less than two hours and a half. It has been estimated that in the handling of 17,000 tons during a year, the crane will save approximately $2,500 as compared to the old method.

CAR HEATING BY AIR PUMP EXHAUST STEAM.

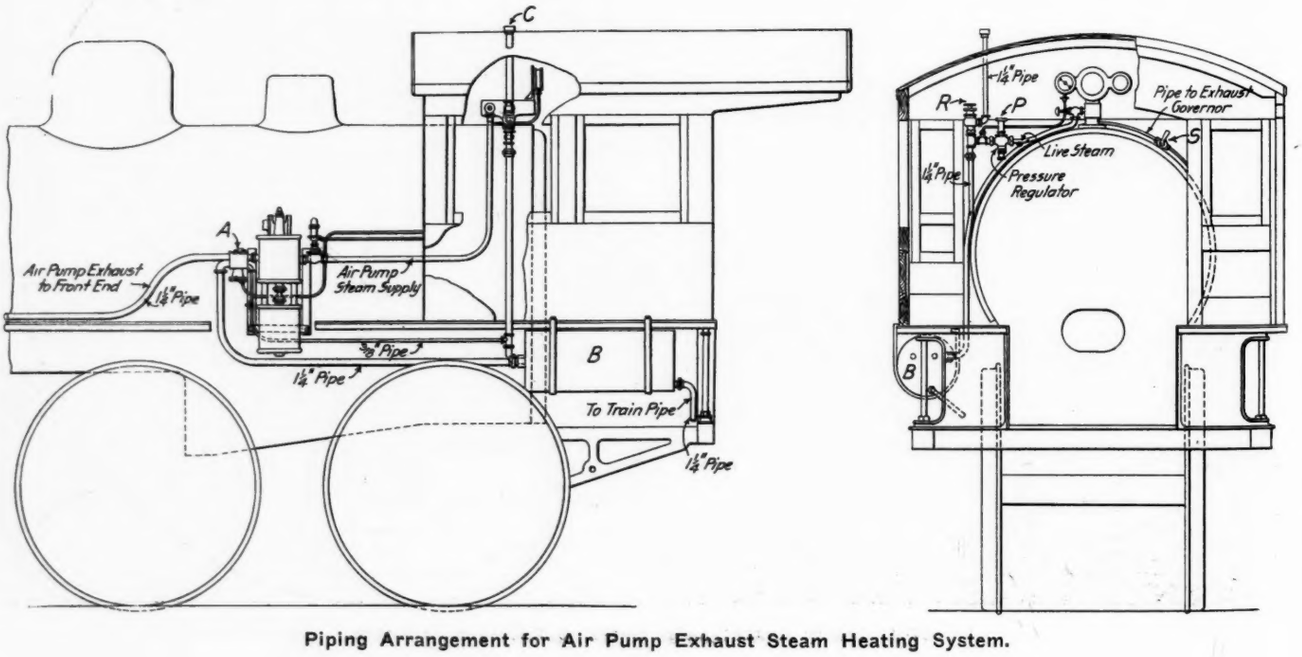
Heretofore the heating of trains with the exhaust steam from the air pump has been objectionable in that it increased the back pressure on the pump. To overcome this objection the Economy Car Heating Company have brought out a by-pass valve which automatically prevents the back pressure in the pump from becoming excessive. This is accomplished by allowing the exhaust steam to expand into the receiving tank *B* of the steam heating system until its pressure has reached a certain point, after which the by-pass valve will automatically close the connection to the receiving tank and allow the pump to exhaust to the atmosphere.

The by-pass valve consists of pistons *D* and *E*, a check-valve *F*, a cut-out piston *G* and a dash pot *H*. The pistons *D* and *E* are 5 in. and 1½ in. in diameter, respectively, and both are provided with two packing rings each to eliminate leakage. They



By-Pass Valve for Air Pump Exhaust Steam Heating System.

are placed on the same stem and act against each other. The larger one controls the flow of the exhaust steam through the ports *L* to the heating reservoir *B* and the smaller controls the exhaust through the ports *N* to the atmosphere. The check valve *F* is located in the body of the valve and controls the con-



Piping Arrangement for Air Pump Exhaust Steam Heating System.

nection between the heating reservoir and the underside of piston *D*. When free, it is held closed by the spring shown, and is so arranged that its stem comes in contact with the underside of piston *D* when it is at one half stroke. Thus it will be seen that when the piston *D* is below half stroke the check valve *F* opens the connection between the under side of the piston and the heating reservoir. The cut-out valve *G* is located at the bottom of the by-pass valve and is operated by the main reservoir pressure, which is controlled by the three-way cock *S* on the engineer's side of the cab. When *S* is open the cut-out piston is raised and with it the two pistons *D* and *E*. This cuts out the connection between the air pump exhaust and the heating reservoir and opens the connection to the atmosphere. The dash pot *H* is provided with a heavy spring to prevent the severe hammering of the piston *D* and *E* when the exhaust is released to the atmosphere.

It will thus be seen that the arrangement is both automatic and under the control of the engineer. When operating automatically the exhaust steam enters the by-pass valve as shown and forces piston *D* down, allowing the steam to expand into the heating reservoir *B*, which supplies the heating system. As previously stated, the reservoir is connected to the underside of piston *D* when it is in its lower position. As the pressure above and below the piston *D* becomes equalized near the end of the pump stroke the upward force will be greater on *D*, on account of the lifting pressure on *E*, and will cause *D* to be raised, thus closing the ports *L* to the heating reservoir and opening the ports *N* to the atmosphere. As these ports open and suddenly relieve the pressure above *D* the check valve *F* closes and the piston is raised only by the expansion of the steam remaining under *D*. This tends to reduce the force of the blow on the dash pot *H* which, with the springs prevents any disastrous hammer blows.

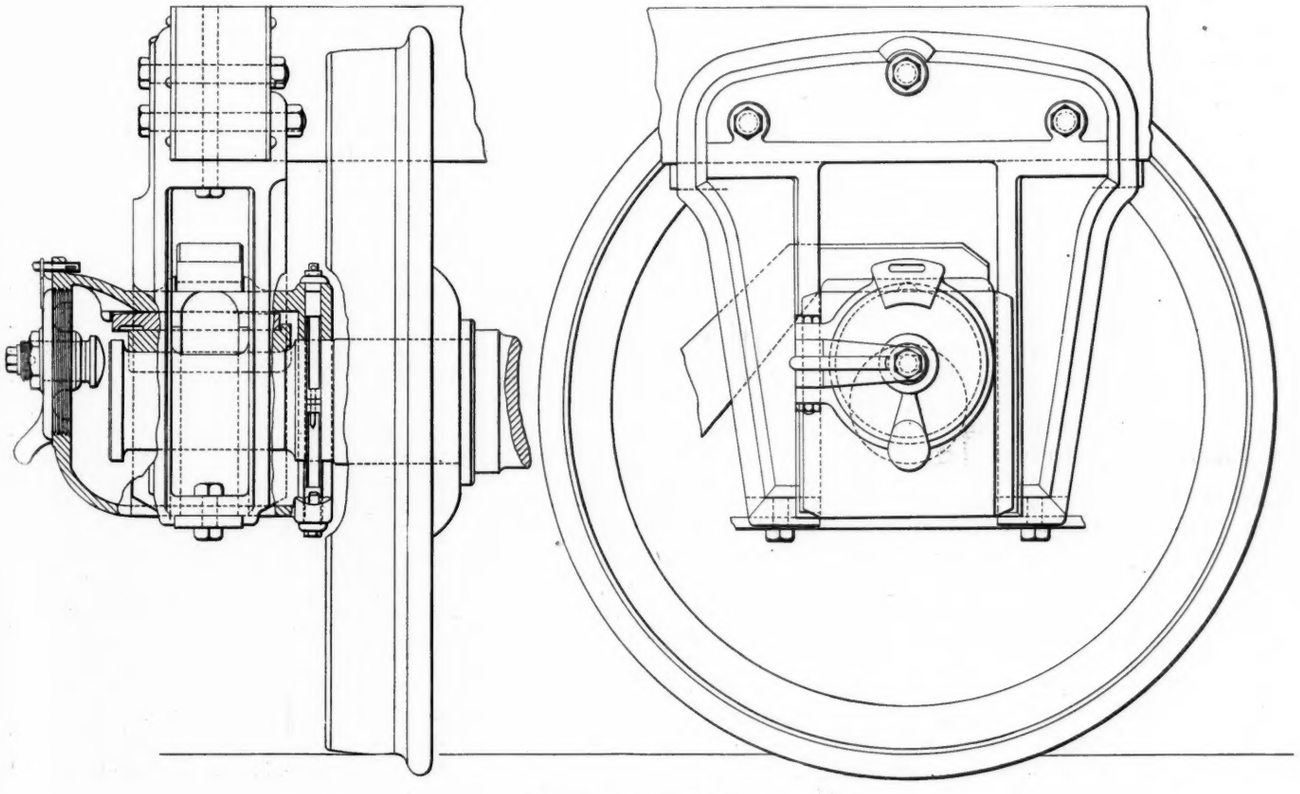
Live steam is fed to the reservoir *B* through the reducing valve *P* to insure a supply of steam in case the pump is cut-out or does not supply sufficient steam for the heating system. This valve may be set to any desired pressure. To prevent the exhaust from the air pump raising the pressure in the reservoir *B* to a point higher than the steam line will stand, the relief valve *R*, set for a pressure approximately 10 lbs. higher than the reducing valve *P*, is provided.

Service tests have been made on this system which have demonstrated that while from 70 to 75 per cent. of the steam used in operating the air pump is utilized, there is no appreciable difference in the speed of the air pump or the amount of steam used. The new equipment is in successful use on a number of roads, and is claimed to make car heating by the use of the air pump exhaust steam practical. The sale of this equipment is handled by the Ward Equipment Company, New York.

NEWCOMB JOURNAL BOX.

The journal box shown in the accompanying illustration is made by the Newcomb Journal Box Manufacturing Company, Carthage, N. Y. It is practically dust proof, and is designed to fit the M. C. B. standard pedestal and to be used with the standard bearings and wedges. It differs from the ordinary box in the design of the cover and the dust guard, and the manner of controlling the lateral motion. The cover is round and is screwed into the box, making a substantial support for the side thrust bearing, which is screwed through the cover. It has a disc of phosphor bronze which bears on the end of the axle about 1¾ inches above the center and is adjusted by screwing in or out; it is held in position by a lock nut on the outside of the cover. In this way the lateral motion is easily controlled. The spring which extends over the cover is used to support it when it is unscrewed from the box.

The dust guard is made of malleable iron, and is split in the middle, one part being above the journal and the other below. Each carries a part of a packing ring which may be made of wood, paper, fiber, babbitt, brass, or any other suitable material. This ring is the only part of the dust guard that needs renewal, and it may be renewed without removing the truck from under the car or without the use of a jack. The malleable iron parts of the dust guard are provided with lugs and dowels



Newcomb Journal Box.

for properly fitting them together. The rings are held in place against the journal by springs which bear against the caps at the top and bottom. When renewing the packing rings the caps are removed and the parts of the guard may readily be taken out. Since the phosphor bronze disc takes up the lateral play of the axle, the end collar of the journal is unnecessary and the ends of the axles are made to a smooth finish so as not to cut the disc. The journal brasses should be made ⅛ in. shorter at each end in order to reduce the possibility of friction. Boxes of this type have run 107 days without oiling or repacking on a locomotive tender truck on the Chicago, Burlington & Quincy. The makers claim that the number of hot boxes will be reduced, that the brasses will wear longer, that the oil and waste will be used more efficiently, and that the journals will not become cut where this box is used.

STATE RAILWAYS TO THE RESCUE.

The great drought in Europe so reduced the crops that the railways, at least in Germany and Austria, have felt constrained to come to the help of consumers by great reductions of rates, especially on forage. The Prussian State Railways have announced such reductions, effective until next July. Some examples will show how great they are. Forage barley from Thorn, on the border of Russian Poland, to Berlin, in carloads of 22,040 lbs. is carried for $22.85, instead of the regular rate of $37.60. The distance is 238 miles by one line and 246 by another, and the reduced rate is 10 1-3 cents per 100 lbs. To Magdeburg, 88 miles further, the carload rate is reduced from $55.45 to $32.50—from 25.2 to 14.8 cents per 100 lbs., the distance being a little more than one-third of that from Chicago to New York. For Indian corn, which comes chiefly from this country, but to some extent also from Hungary and Argentina, the rate, which was $32.84 per carload from Hamburg to Berlin, 178 miles, is reduced to $17.61, or from 14.9 to 8 cents per 100 lbs. From Oderburg, on the Austrian frontier, through which imports from Hungary come, to Magdeburg, a long haul (for Germany) of 571 miles, the rate on corn is reduced from $68.78 to $35.46 per carload, the reduced rate being 16 cents per 100 lbs.

Other forage is carried at one-half the regular rates, as, for instance: Bran, from Thorn to Berlin, pays $10 per carload instead of $20, bringing the rate down to 4.5 cents per 100 lbs., reminding one of rates made in competition with the Erie canal, the distance from Buffalo to New York, however, being nearly twice as great as that from Thorn to Berlin.

Heretofore when reductions in rates on forage have been made in Prussia because of scarcity, they have applied only to shipments to farmers and stock growers. This time they are general. It is hoped that the low rate on Indian corn will cause it to be used in distilleries instead of potatoes, which are very largely used for making spirits, the sandy lands of North Germany being better for potatoes than for grain. This year the potato crop has suffered, especially from the drought, and it is desirable that it shall be saved for food so far as possible, it forming always a very large part of the diet of the working population. The rates on potatoes are reduced 50 per cent. This makes a charge of 4½ cents per 100 lbs. for nearly the whole length of the kingdom, from Eylau to Dortmund, 579 miles. A large reduction is also made in rates on sea fish from North Sea ports inland, to take the place, so far as may be, of the most which cannot be fattened this fall.

A still further reduction in rates is made on shipments to town officers, charitable organizations, clubs, etc., which sell at cost price.

Until May reductions are made also in the raw materials for making artificial manures and on the manures themselves. The drought has prevented the growth of the green manures which are usually plowed in, and it is argued that a much greater consumption of other manures is required to make up for them.

These reductions will doubtless reduce the gross earnings by some millions for some nine months, but will perhaps prevent a more serious loss later on. The Prussian railways have had a considerable increase in gross earnings so far this year, and, it is said (expenses are not reported till the close of the year), for some months no considerable increase in expenses. They are thus in condition to sacrifice a part of their profits for a time. Baden and Bavaria, and by this time probably other German states, have followed Prussia in these measures, and Austria has engaged to do something, although it is badly in need of all that its state railways can bring in.

One result of the drought has been noticeable. With so great a reduction of production we might expect also a reduction in traffic. But the drought has made the water so low in the rivers which empty in the North Sea that their navigation has been interrupted, and millions of tons usually floated down have been diverted to the railways, which have had a shortage of cars when normally, after the acquisitions of late years, they should have had a surplus. The beet harvest, which presses them greatly in October usually, is now on, and is so light that they will probably be relieved earlier than usual. The effect of this light crop has already been felt in the price of sugar in America.

FOREIGN RAILWAY NOTES.

Gabriel C. Valverde has applied to the Bolivian government for permission to build a branch line from a convenient point on the Arica-Viacha Railway to Oruro. Mr. Valverde plans to carry out the work at his own expense, without guaranty from the government.

The Swiss State Railways are earning a little more this year than last, but substantially the whole increase is absorbed by larger expenses, the gain in net for seven months is little more than ½ per cent. Most requests for additional passenger trains, etc., have been refused, as the authorities see the need of great economy for some time to come.

Russia was fairly beginning to equip itself with railways down to the time of the Japanese war; but since that time it has added comparatively little to its mileage. In 1885 it had 15,911 miles in its immense territory, the part of which in Europe alone has two-thirds the area of the United States. It added 2,792 miles to this in the next five years, 3,789 miles from 1890 to 1895, and then no less than 11,204 miles from 1895 to 1900, when it bid fair to be the great field for railway building for at least a decade or two. But with the war came a setback, as may be seen by the following statement of the mileage opened in each of the last four years reported: In 1906, 1,561 miles; in 1907, 1,053 miles; in 1908, 280 miles, and in 1909, 262 miles; or 3,156 miles in four years, and nearly half of that in the first of them. There has been, however, a considerable amount of second-track added and other improvements, more needed, probably, than new road. This gives Russia 41,681 miles in all.

There appears to be a boom in Japan in respect to light railways, since the passing of the light railway subsidy law in August last year. Applications filed for charters number 136, with a total mileage of 1,952 and a capital of over $50,000,000. Up to the present time charters have been granted to 66 companies, with an aggregate capital of about $21,450,000. New applications continue to reach the railway board at a rapid pace and it is expected that by next April double the number now registered will have been received. It may interest manufacturers having dealings with Japanese railways to know that the railway board has recently been reorganized and is now under direct control of the minister-president. The business connected with the South Manchuria Railway has been separated from the board and transferred to the jurisdiction of the Colonial bureau. The railway board controls all business relating to the state railways of the country, as well as business relating to private railways, light railways and tramways.

Maintenance of Way Section.

WE have been obliged to postpone the publication of the papers submitted in the contest on "Methods of Keeping Cost Data for Maintenance of Way Work" until next month, because of lack of space, resulting from the publication of the report of the Bridge and Building Association convention at St. Louis. This action will allow the judges more time to carefully consider the various papers, as the subject treated in this contest is one of the most important we have covered up to this time. Nine papers were submitted in the contest, and the best papers will be published in the November Maintenance of Way section, together with the names of the successful contestants. Because of the postponement of this contest, the competition on Construction Kinks, which it was originally announced would close on November 1, will not close until November 25. A large number of kinks arising from a wide variety of conditions should be received in this contest. The field embraces all devices or methods resulting in a saving of time or labor, or a gain in efficiency and adapted to handling any feature of construction or reconstruction work, from the clearing of the right-of-way to the ballasting of the completed track, except those relating to bridge and concrete work, which will come within the limits of another competition. Prizes of $25 and $15 will be awarded for the best two contributions, and all other contributions submitted which are accepted and printed will be paid for at our regular space rates. Kinks should be sent to the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than November 25.

THE difficulty met by the Bridge and Building Association in getting out the committee reports in time for publication before the convention has in a measure been common to other associations. Coupled with the honor and the opportunity for investigation accompanying the assignment of a member to a place on a committee, there is a distinct duty to be performed, and an incomplete or delayed report is but a partial fulfillment of the obligation. For the association to secure full benefit from a report it should be in the hands of the secretary in time for him to have it printed and mailed so as to reach the members several days in advance of the convention. The members then have an opportunity to study the report and are prepared to discuss it intelligently at the convention. On the other hand, if the members secure their first knowledge of a report when it is read at the convention, and have no copies before them, the discussion is very likely to be incomplete, and vital points will be overlooked. The more valuable a report is, the greater is the necessity that the members have it in hand a sufficient time in advance of the convention for them to absorb its contents. Again, the forwarding of reports to the secretary at the last minute complicates matters for him, as he is burdened at that time with the many other details incident to preparation for the convention and cannot give the time to the final arrangement of the reports which he would be able to give if they were sent in earlier. It is important that the individual committee chairman co-operate with him in this regard. The delay of sending in reports is largely due to lack of committee organization early in the year. In many cases little work is done until late in the season and the convention is at hand before the members realize it. A study of the methods followed by those committees whose reports were completed in proper time will generally show that these were organized and began the collection of their material soon after their appointment. In this way they are able to compile the report gradually without undue exertion on the part of any member and complete their work in proper season. These associations are built up and maintained because of the benefits received by the individual members from the investigation of subjects and the exchange of ideas along the lines of their work. Every effort should be made to secure the greatest benefits for the membership at large, and one of the most effective means of accomplishing this is the thorough preparation of all committee reports in advance.

THERE are many conditions under which it is either necessary or more advantageous to handle work by force account, because of the difficulty of measuring the amount of work done on other than the day basis. As an instance of this, the three following conditions arose in connection with the rebuilding of a large yard recently. It was necessary to do a small amount of grading along a busy ladder where the interference due to switching was heavy and so irregular that the contractor could not estimate closely on it. In another place it was advisable to start a portion of the work before all plans were definitely decided on and the amount to be done was not definitely known. In the third case the work consisted of light and uneven grading, which it was impossible to measure accurately on a yardage basis. Under such conditions, where payment is made for the actual force employed, it is necessary that accurate records be kept by both the contractor and the engineer or other railway representative in charge. Usually each keeps a separate record and little or no attempt is made to see that they agree, with the result that when the conractor receives his estimate he frequently finds discrepancies and complains of under payment. To avoid this constant trouble, work is often let by contract at an increased cost. Any method which will eliminate such disputes is of distinct advantage to both parties, and it is surprising that some plan such as that described elsewhere in this issue by Mr. Woollner is not in more general use. The engineer, or inspector, and the contractor each makes his daily record of the force employed; by checking these reports against each other daily, discrepancies can be eliminated while the details are fresh in their minds. By attaching the signatures of both to the report it is made final for that day, and neither can go back of it. This system has been given a thorough test in the construction of the Northwestern Pacific, where a large amount of force account was necessary, such as building roads into the line and hauling in company material, and has been found to work out very satisfactorily.

IT is a common tendency of the section foremen to gather up all the material they can lay their hands on for some possible emergency; and it requires careful supervision on the part of the roadmaster or supervisor to keep down the amount thus accumulated. Small quantities of material left over from relaying rail or from construction jobs seldom find their way back to the storehouse, but are put away by the nearest section foreman against the day when he will need them, which perhaps may not come for a year. These quantities may be small individually, but in the aggregate they become a large amount on an entire system. It is safe to say that an investigation on almost any road will show many ways in which money is tied up in reserve stock which could be released without any detriment whatever to the service. One large western road a year ago changed from the practice of placing an emergency rail at every mile-post to the practice of placing one every two miles, and in this way released over $30,000 worth of rail. Many roads keep at each tool house a frog and a set of switchpoints, together with other material to provide for emergencies; others simply keep one complete set of the materials used on the division at some central point ready for shipment wherever needed. This material should be placed on some platform where it can be readily loaded on cars, or, better still, it may be kept loaded on a car ready for quick movement, and without the necessity of waiting for men to load it. Practically every road has cars which are not fit for commercial service, but which could be used in

this way. By such methods much of the emergency material ordinarily kept along the line can be returned to the storekeeper.

SECTION FOREMEN'S MEETINGS.

THE practice of calling together the section and extra gang foremen at regular intervals for instruction and the discussion of topics directly connected with their work is of such value to both the men and the company that it is surprising that it is not more generally adopted. The only reason why it is not appears to be that many roadmasters and other officers in charge of track work do not know the possibilities of such meetings. Other departments have had staff meetings and discussions for years, but they have not been common in the maintenance department. On most divisions the train service is such that it is possible for the foremen to assemble at a central point in the morning and return home in the evening. In some cases these meetings are held on Sundays when they can gather without leaving their work. At other places they come together during the week, leaving their gangs in charge of assistant foremen for the day. It is considered that the gain in knowledge and in interest in their work by the foremen more than compensate for the time spent.

Such meetings are of value in several ways. A general discussion of any track topic by 20 or 30 foremen is certain to bring out many ideas new to the majority of them. Such discussions are of special value to the younger foremen, who pick up many points by listening to the older men. The meetings also afford an opportunity to those in charge of track work to instruct the men regarding new devices and to talk with them concerning general track standards, which tend to promote uniformity of work. An opportunity is also afforded for men in the other branches of the operating department to meet with the foremen and talk with them about matters of mutual interest, the result being better co-operation. Last spring on a road on which a reduction of force was ordered the roadmaster took advantage of such a meeting to explain the situation fully and to ask the foremen how many men they could let go and still maintain the track safely. After studying the matter carefully the foremen figured out where they could reduce their forces the required amount without impairment of the service. In this way the foremen shared the responsibility with those above them and did not lose interest in their work, as so often happens when they suddenly receive arbitrary orders to reduce forces.

On the Erie, foremen's meetings were begun last winter, and held regularly until summer work was begun. These were attended by the engineer of maintenance of way, division superintendent, division engineer, supervisor of track, supervisor of bridges and buildings, supervisor of signals, and all of the foremen in their different departments. In the morning the officials talked to the men on the problems of handling labor and material, and regarding efficient methods of work. In the afternoon each foreman was required to tell of the most serious conditions existing on his section or territory, of which he felt he had reason to complain. In some instances their complaints were found to be groundless. In other cases there were found to be good reasons for them, and the conditions were accordingly remedied. Such good results were secured that it is planned to resume the meetings this fall.

One advantage of them from the standpoint of the men is that they afford them a chance for a little recreation and an opportunity to see other men's track. The section foreman's outlook is very restricted at best, and he has few opportunities to know how other track men are doing their work. The Union Pacific had a practice several years ago of having all section foremen on a roadmaster's district meet the annual inspection when it came on that district and go over it with the train. In this way each foreman was enabled to see the condition of every other foreman's track, and also to hear the comments and criticisms of inspecting officials, thereby securing much valuable information. While for some reason these trips were discontinued sometime ago, the old foremen still talk about them and about what they learned on "the special."

MAINTENANCE WORK BY CONTRACT

THE tendency to contract certain portions of maintenance of way work is gaining ground today, and a number of roads are using this method experimentally on work which has heretofore been done exclusively by company employees. The declining efficiency of the foreman as well as of the laborer indicates forcibly the need of some change in the way of doing this work. The average laborer takes little interest in what he is doing, and does no more than the foreman requires of him. Any method which will awaken the interest of the average trackman and foreman results in more and better work. It is in arousing this interest that the letting out of work by contract attains its principal advantage. In the instance of putting in rock ballast on the Michigan Central, referred to elsewhere in this issue, the road is getting more work done per man than formerly and at a considerably decreased cost, while, at the same time, the contractor is making a reasonable profit. He is spurred on by the knowledge that his profits depend directly on the amount of track ballasted, and he secures more work from his men than he would if acting as a foreman for the railway. By employing men of his own nationality, as in this case, he also understands them better and is able to handle his force more successfully than if handicapped by having an interpreter. At the same time, the proper standard of work is maintained by placing a company inspector on the ground. The greatest advantages of a method of this kind are secured by letting the work out in contracts of such small size that the contractor is able to devote his attention to the immediate work. The letting of a large contract to one company would result in the foreman bearing the same relation to the contractor that he now bears to the railway. The personal interest he has in the profits bears a very important relation to the efficiency he secures. On several other roads ballasting work has been done by contract for a number of years under similar arrangements and with good results. There are several other classes of maintenance work to which the same principles will apply. One eastern road let a contract last spring for the renewal of ties on a certain district, and, while the contract had to be canceled early in the season because of labor troubles with the contractor, it is planned to try the same arrangement next year. Another detail which can frequently be contracted is mowing weeds along the right-of-way. There are large areas on which the weeds are cut by hand where they could be cut by a farmer with a team and mower at but a small proportion of the expense of hand work. Other large areas can be leveled off so that they can be mowed in this way at a greatly reduced cost.

One of the largest fields for economy is in contracting minor repairs to depots and other buildings to local workmen, instead of sending company employees from division headquarters probably 100 miles away. It is manifestly cheaper to hire a local carpenter to repair a leak in a roof or to put a new lock in a door than to have a man spend a day on the road each way to do a couple of hours' work. In such a case the expense of doing the actual work is but a small proportion of the total cost. Again, in handling such work much time is often lost either in waiting for small amounts of supplies or in sending men to unload small amounts of material before the work can be started. The Erie has given the subject of contracting maintenance work careful attention, and has adopted it in several instances. In handling repairs to buildings a local contractor submits his bid, and after it is approved by the division engineer he is allowed to proceed with the work. For all amounts under $25 he is paid at once by the station agent from the funds on hand.

ENGINEERING ARTICLES SINCE SEPTEMBER 15.

THE following articles of special interest to engineers and maintenance of way men and to which readers of the maintenance of way section may wish to refer have appeared in the issues of the *Railway Age Gazette* since September 15:

Farm Communities and Permanent Railway Labor.—The relation of economic conditions in the foreign settlements in our cities and the colonization movements in our rural communities to the supply of track laborers is touched on in an article by Alice Bennett on page 560 of the issue of September 22. Editorial comment on this subject appears on page 547 of the same issue.

The building of the Alaska Northern Railway is a good example of the possibilities of railway construction in a country which it is usually thought presents insurmountable difficulties to railway construction and operation. The territory traversed by this line, some of the difficulties in its construction and operation, and its possibilities for future traffic are described in an illustrated article in the issue of September 22, page 561.

Trackmen's Strikes.—A news note concerning a strike of maintenance of way employees on the Delaware, Lackawanna & Western and other track labor news appears on page 566 of the issue of September 22, and page 603 of the issue of September 29.

Tonnage Rating of Locomotives on the Burlington.—An abstract of Bulletin No. 138 of the American Railway Engineering Association, by M. H. Wickhorst, was printed in the issue of September 29, page 592. The article outlines in detail the method of equating tonnage rates on the Burlington.

The construction details of a concrete engine house built for the Elgin, Joliet & Eastern at Joliet, Ill., are given in an illustrated article on page 597 of the issue of September 29.

The structural details and a general description of the steel barge Mastodon built for Morgan's Louisiana & Texas Railroad & Steamship Company for service in transferring passenger and freight trains across the Mississippi at New Orleans are given in an illustrated article in the issue of September 29, page 600.

The Rail Situation.—An editorial comment on the immediate need of improvement in rail specifications to guard against the numerous accidents caused by rail failures appeared in the issue of October 6, page 627.

Addresses to Engineering Students.—A review of a book just published by Waddell & Harrington, including a number of addresses to engineering students by prominent educators, was published on page 628 of the issue of October 6.

New York Central's West Side Improvements in New York City.—Many plans have been suggested for improving the west water front of the city of New York, which is occupied by the freight tracks of the New York Central. The New York legislature has passed bills prescribing the general plan for this improvement, which must be finished within six years. The detailed plan submitted by the railway company for meeting the requirements of the legislature was described in an illustrated article in the issue of October 6, page 636.

The installment of the series of Letters from an Old Railway Official to His Son, a General Manager, which appeared on page 638 of the issue of October 6, contained some very interesting comments on railway construction work and the handling of contracts.

Rapid Bridge Work on the Boston & Albany.—The Boston & Albany has developed some advanced methods of replacing bridges, one of which was described in the issue of May 5, 1911. The latest example of this class of work was the replacing of a bridge at West Springfield, Mass., which is described in an illustrated article on page 639 of the issue of October 6.

Construction Work on the Cleveland Short Line.—The building of the Cleveland Short Line around the city of Cleveland, Ohio, has involved widely different and extremely difficult problems in engineering, including all the common problems of tunneling, bridging and track elevation and many new ones arising from the location of the line through the city. The interesting features of this work are described in an illustrated article on page 705 of the issue of October 13.

Letters to the Editor.

RENEWING TIES TO FACE.

CHICAGO, October 10, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The method of renewing ties to face advocated by R. P. Trabue in the issue of the *Railway Age Gazette* of August 18 is of direct interest to all track men, and is a subject worthy of careful consideration. The practicability of this method depends largely on other track conditions, such as the kind of ballast used, the average life of the rail and the life of the tie. Mr. Trabue's experience has evidently been with rock ballasted track, and the advantage of a complete renewal to face is greater on such track than when gravel or other more easily worked ballast is used. There is no question but that the annual disturbance of rock ballast is disastrous to good riding track unless a large amount of labor is expended.

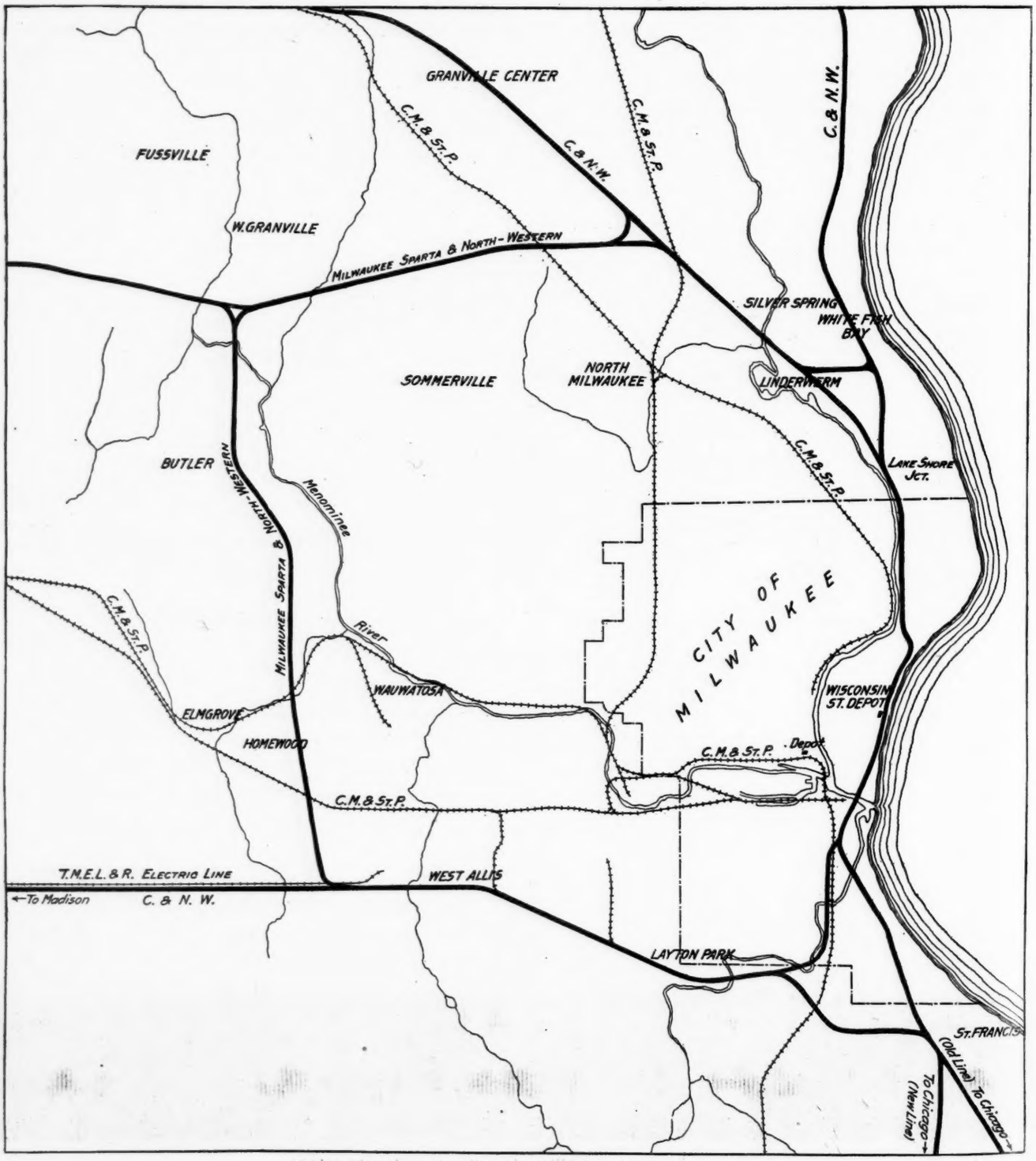
On account of the size of the equipment used today it is found that even when the quality of the steel is good the life of the rail very frequently is about equal to the life of the ties. For this reason many roads are in a way following the same plan as Mr. Trabue in taking special pains to see that the track is put in first-class shape at the time the rail is renewed. All ties that will not last three or four years are removed, the track is surfaced so that all ties have an even bearing, and it is put up to good gage on tie plates. In this way a permanent structure is approached, and but little work in the way of tie renewals and gaging is left for the section men to do during the life of the rail, while the amount of extras to be done, most of which ordinarily remain undone because of the press of other duties, is reduced to a minimum. This is especially true of the proper gaging of the new rail. If it is laid to accurate gage the section foreman will make a special effort to keep it so. On the other hand, if the gage is left bad the section foreman with his small gang is not apt to regage it, and even if he does the rail is frequently worn out before he gets over the entire section. Under this method of permanent construction in relaying steel it is possible to use crushed stone ballast with but little additional cost for future maintenance, as there is no question but that crushed stone holds the track in shape longer than other ballast; and with the track properly put up on a solid sub-grade when the steel is laid, it should need no further general surfacing during the life of the rail. The amount of picking up of low spots is also reduced to a minimum. Ordinarily about three months of the best part of the year is spent on tie renewal work alone, leaving little time for the numerous other important details necessary for proper maintenance. With such a method of construction section forces are able to devote more time to tightening bolts and keeping crossings, station grounds and right of way in good condition.

On the other hand, the advantage of a complete renewal of ties is not so great on a light traffic line, where the life of the rail exceeds the life of the tie, which is the case on a large proportion of the mileage of this country. It will probably frequently happen, in the case of the complete renewal system, that, when ties have about reached their limit, business will suddenly fall off, and the management will suggest "getting along another year." This would certainly not be a safe thing to do, but, nevertheless, as long as records of expenditures are maintained at the expense of the track, this state of affairs is sure to arise if the complete renewal system is tried. H. K. R.

CONSTRUCTION WORK ON MILWAUKEE BELT SECTION OF THE MILWAUKEE, SPARTA & NORTHWESTERN.

In connection with the building of the Milwaukee, Sparta & Northwestern, a low-grade line from Lindwerm, Wis., to Sparta, the Chicago & North Western has added a belt connection around the city of Milwaukee, to eliminate the congestion of traffic in that city and to open a strip of territory desirable for industrial development. The relation of this belt line to the North Western's operation in the vicinity of Milwaukee was shown in an illustrated article in the *Railway Age Gazette* of February 24, 1911, page 354. This section of the new road is now about finished, and it is expected to be turned over for operation in a short time.

The belt line leaves the Madison division of the Chicago & North Western about one mile west of West Allis, running northerly for about eight miles to a connection with the main line of the new Milwaukee, Sparta & Northwestern. The line is double track with a maximum grade of 0.5 per cent., compensated, and is laid with 90-lb. rail and gravel ballast. The principal construction features are the Butler yard and engine terminal and the structures over the Menominee river, the two divisions of the Chicago, Milwaukee & St. Paul Railway and the electric line of the Milwaukee Electric Railway & Light Company.

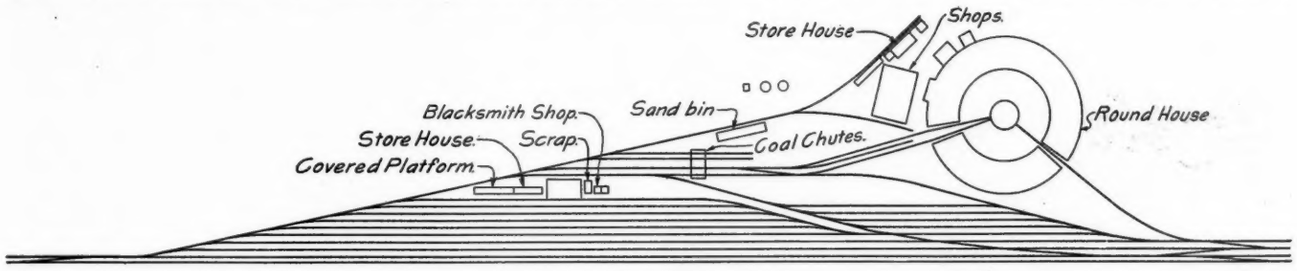


Chicago & North Western Lines Around Milwaukee.

BUTLER YARD.

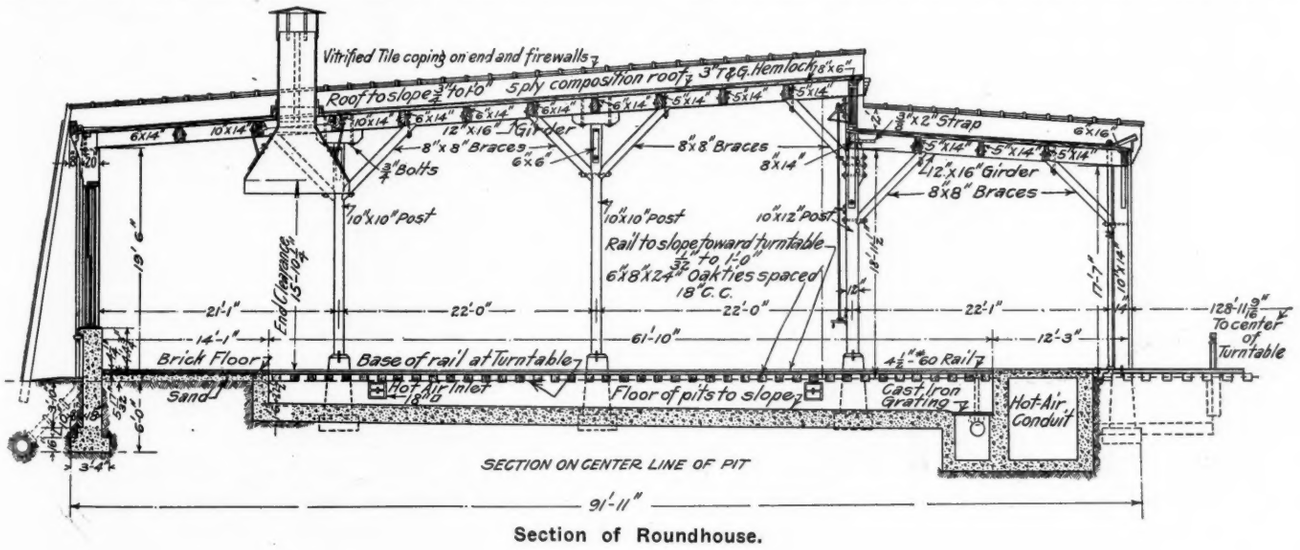
The terminal lay-out is divided into two parts by a highway crossing at the new town site of Butler. Although the grades have not yet been separated at this crossing, it is probable that the road will be carried overhead on a steel viaduct. The classification yard is south of this point and the repair yard and shop building group are north. The classification yard is on a level grade and contains 21 tracks with a capacity of 1,525 cars. It is laid with 72-lb. rail on soft ties and gravel ballast. The tracks are laid 13 ft. center to center, with No. 7 turn-outs from ladders. The yard is on a very light fill, the material for which came from a cut about three miles south. This cut furnished about 42,000 cubic yards, which made all fills on the 8-mile section.

The repair yard has eight tracks spaced 20 ft. center to center, and is served by a ladder at each end. The group of buildings includes, in addition to the roundhouse, a power house and machine shop, storehouse, sand bin, coal chute, blacksmith shop and air brake room, paint shop, office building and club house. The engine house is the company's standard 90-ft. brick house having a 60-stall circle. The two openings, a single track from the classification yard and a double track from the engine leads, occupy the space of three stalls, leaving 57 stalls for service.

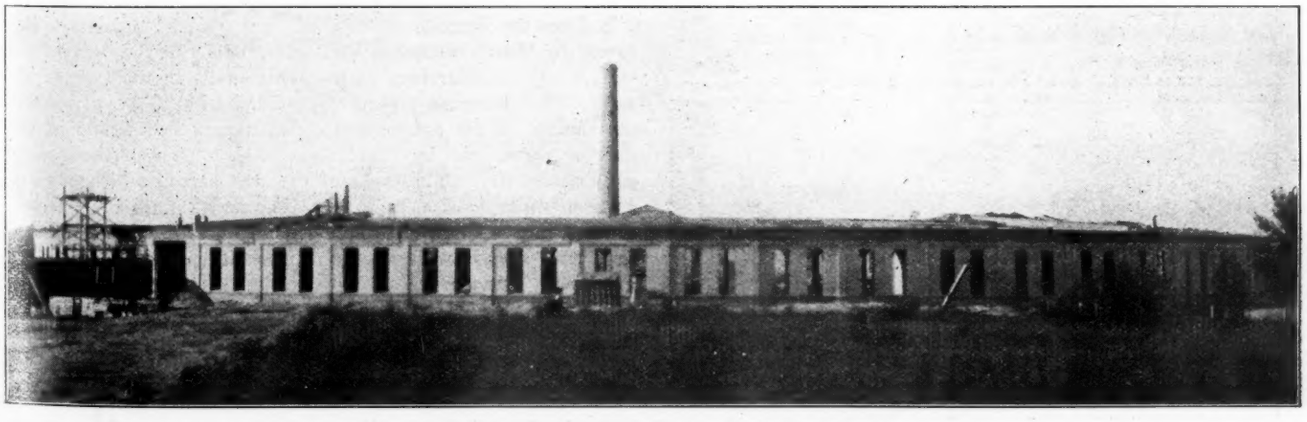


Repair Yard and Engine Terminal.

There is a standard 80-ft. turntable on a concrete foundation. The foundation and side walls up to 4 ft. 5 in. above the base of rail are of concrete, and the brick wall above the concrete is 16 in. thick. The roof is 3 in. x 8 in. D. & M. planking covered with 5-ply composite tar and gravel roofing. The running rails in the engine house are 60-lb. laid on 6 in. x 8 in. x 24 in. ties on 18 centers set flush with the surface of the concrete. The house is heated by blowing hot air through concrete ducts below the track level from a heating and fan room adjoining the house. The main duct is laid just within the inner circle of the engine house, and connects with laterals between each pair

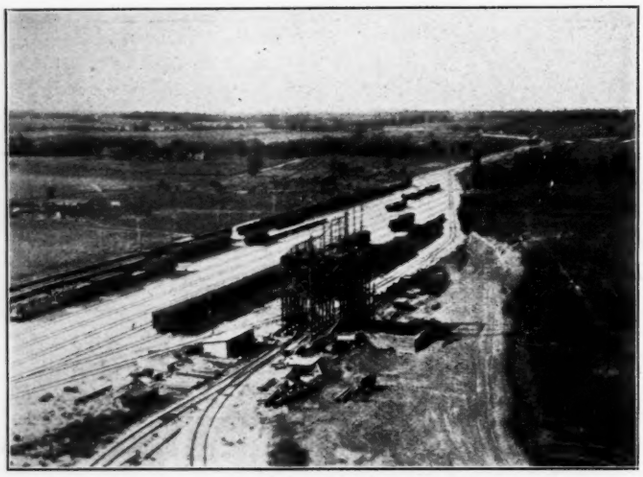


Section of Roundhouse.



Roundhouse; Milwaukee, Sparta & Northwestern.

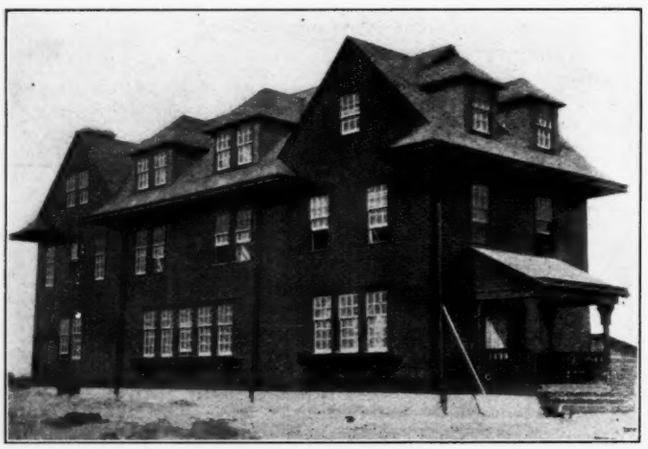
of stalls. Two openings from each lateral admit air to the track pits, the openings being controlled by dampers. The smoke jacks are of a patented composition sold under the trade name Transite. The concrete in the foundations was placed from three mixers inside the circle located approximately at the third



Repair Yard and Coaling Chute During Erection.

points. The material was brought in in standard cars and wheeled to the mixers and the concrete was wheeled away to the forms.

The power house is 100 ft. x 109 ft. 10 in., divided into a boiler room, generator room and machine shop. There will be a



Club House.

battery of five boilers and a generator supplying electric power for operating the machines in the shops, for lighting all buildings and for operating the fan for the heating system. The power house chimney is brick, 120 ft. high and 7 ft. inside diameter at the bottom.

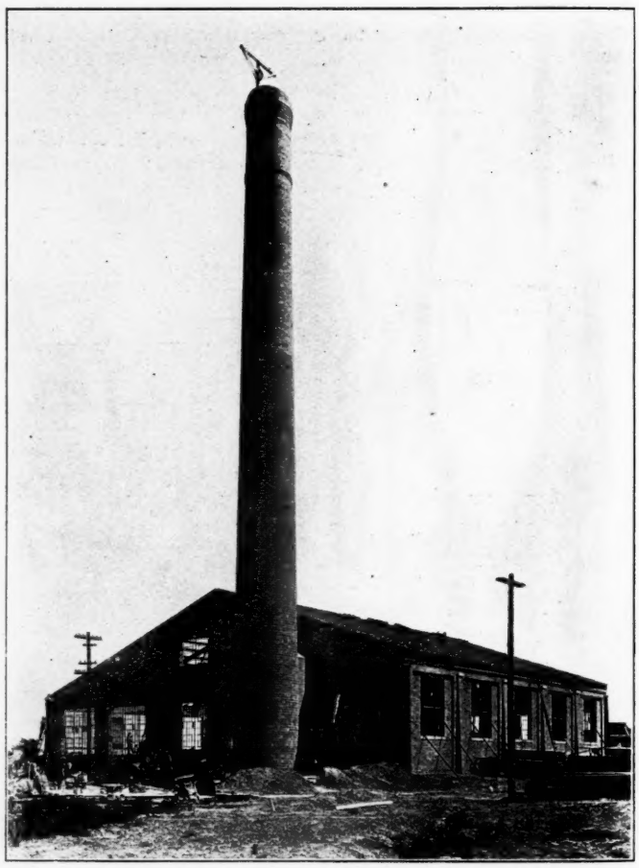
Menominee River Arch.

The coal chute is a frame structure on concrete foundation of the standard automatic hoist type, built by Fairbanks, Morse & Company, Chicago. It has a capacity of 600 tons and provides for coaling engines on two tracks.

The club house, which provides living accommodations for trainmen, is a 3-story frame building on concrete foundation, with slate roof. It contains 18 double rooms, in addition to the living room, dining room, kitchen, halls, baths and living quarters for the family conducting the house. The building is equipped with electric light, steam heat and running water.

MENOMINEE RIVER ARCH.

The Menominee river is crossed just south of the junction of the belt line and the main line of the Milwaukee, Sparta & Northwestern, and is carried under the tracks in one 40-ft. and two 32-ft. concrete arches. The footings are on rock and gravel, the maximum pressure allowed being 6,500 lbs. per sq. ft. The arch barrels are reinforced in both directions by ½-in. corrugated bars spaced 1 ft. center to center at a uniform distance of



Power House; Milwaukee, Sparta & Northwestern.

3 in. from the intrados of the arch. The parapet walls are reinforced by ¼-in. corrugated bars set vertically in the back of the wall, and by similar bars placed horizontally in the face of the wall. The up-stream piers are provided with 60-lb. rails set in the surface of the concrete as ice breakers, the method of anchoring these rails by ½-in. rods being shown in the accompanying drawing. The backs of the arch barrels and bench and parapet walls have a smooth mortar finish and were waterproofed in the following manner: The concrete, when clean and dry, was painted with a coat of asphalt cut with naphtha or gasolene. This surface was covered by ½ in. of asphalt mastic, made of one part asphalt to four parts of clean sand, spread in place and well smoothed with smoothing irons. The entire surface was then mopped with hot asphalt and sprinkled with sand. The concrete mixtures used in this structure were as follows: Arch rings, copings and parapet walls, 1:2:4, stone to pass a 1½-in. ring; bench walls and wing walls, 1:3:5, stone to pass a

2¼-in. ring; footings, 1:3:6, stone to pass a 2¼-in. ring. The yardage in the complete structure was approximately 6,000 yards.

CHICAGO, MILWAUKEE & ST. PAUL CROSSINGS.

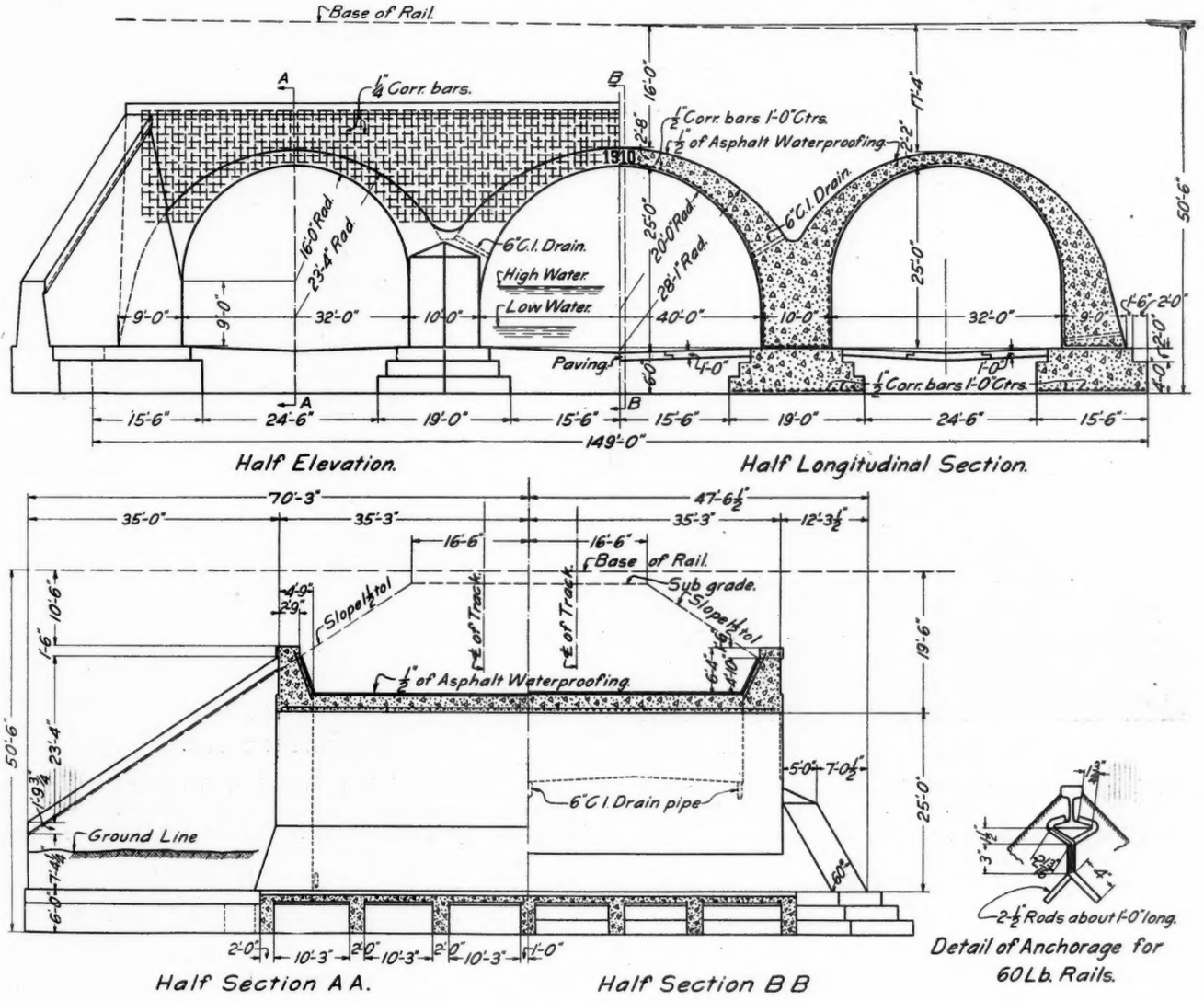
The La Crosse division and the Prairie du Chien division of the Chicago, Milwaukee & St. Paul are crossed by the belt line on riveted through truss structures with open trough floors. The Prairie du Chien division crossing is near a highway crossing, the latter being spanned by the deck plate girder approach shown in the accompanying photograph. The La Crosse division is crossed on a double-track through riveted lattice truss having a span of 170 ft. ½ in. Cooper's E50 loading with the impact formula $I = \frac{3/4 L}{L+D}$ was used to determine live loads for the trusses, longitudinal girders and floor troughs at panel points. For intermediate troughs, 30,000 lbs. on each rail was assumed to be distributed on two ties. The unit stresses used were:

Tension for structural steel, 15,000 lbs. per square inch.

Compression for structural steel, $\frac{15{,}000}{1 + \frac{L^2}{13{,}500\ r^2}}$ lbs. per square inch;

Bending for pins, 22,000 lbs. per square inch;
Bearing for pins and shop rivets, 22,000 lbs. per square inch;
Shearing for pins and rivets, 11,000 lbs. per square inch;
Shearing for web plates (gross section), 9,000 lbs. per square inch.

The open trough floor in this bridge, which requires only 1 ft. 10⅞ in. between low steel and base of rail, is typical of the construction which the Chicago & North Western is using in cases where the requirements of clearance demand a thinner floor than can be secured with the common floor beam construction. Longitudinal plate girders, 4 ft. ¼ in. back to back of angles, are placed 2 ft. 1 in. inside of the trusses, and the floor troughs, which are built up of plates and angles, are connected to the web and stiffener angles of these girders. Shelf angles reinforced by vertical angles and connected by cover plates are riveted to the web plates of the troughs at three points under each track, as shown in the accompanying drawing, and the ties laid directly on these cover plates. Every fourth tie is held in position by a bolt and the guard rails are bolted through the ties to the supporting plates. The intermediate troughs are 11⅜ in. wide, center to center of web plates, and the troughs under panel points are 1 ft. 2 ⅞ in. wide. All troughs are 1 ft. 6¾ in. high, back to back of angles. Drainage is provided by setting sections of 1-in. gas pipe, 1 ft. 3 in. long, vertically in the bottom cover plate at each end of the troughs just inside the girders. These pipes are threaded on the lower end for a length of 4 in. and are held in place by a hexagonal nut above the plate. The troughs are filled with asphalt mastic sloped to drain to these openings at the ends of the troughs. Details of this design are shown in the accompanying figures.



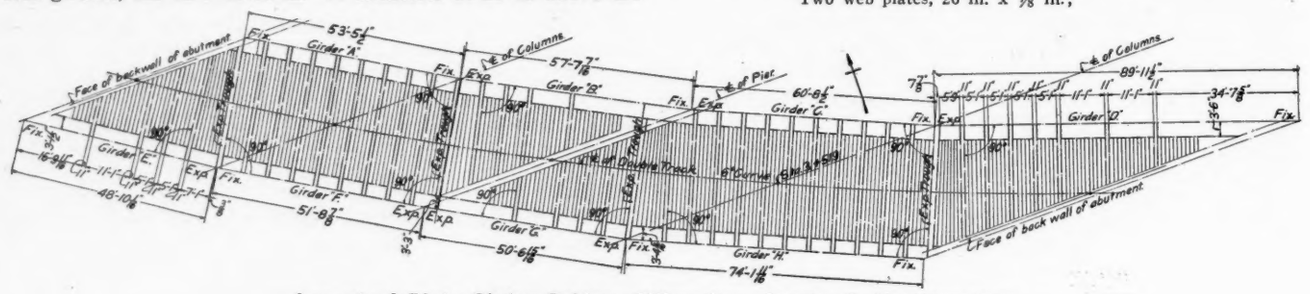
Sections of Arch.

MILWAUKEE ELECTRIC CROSSING.

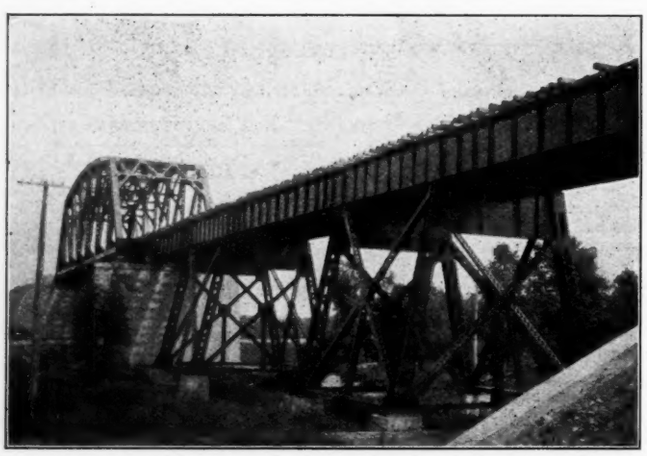
At the point where the belt line leaves the Chicago & North Western, the latter line is paralleled by a double track electric railway of the Milwaukee Electric Railway & Light Company.

These tracks are crossed overhead by the belt line on a through plate girder structure with trough floor. The alinement is a 6 deg. curve cutting the center line of the electric road at an angle sharper than 30 deg. The girders are carried on concrete abutments, a concrete center pier and intermediate steel columns. The total length of inside girders is 262 ft. 5-16 in., and of outside girders, 225 ft. 7 11-16 in. A clearance of 20 ft. above the top of rail of the electric line is provided, and by using the trough floor construction the distance from low steel to base of rail is reduced to 2 ft. 7¼ in. The curved alinement and sharp angle of intersection made necessary special designs at the ends of the girders. As shown in the accompanying drawing, girders D and E support one end of each of the floor troughs in the end section, the other ends resting on the abutments; girders H and C, and F and A, respectively, support opposite ends of floor troughs, and girders B and G support the outer ends of troughs whose inner ends rest on the center pier. As far as possible the troughs are perpendicular to the supporting girders. The conditions of loading and the unit stresses allowed in this design are the same as for the truss bridge described above. Girder H, the heaviest in the structure, is made up of the following sections:

Two 8 in. x 8 in. x ¾ in. angles;
Two 15 in. x ½ in. side plates;
Two 18 in. x ¾ in cover plates;
One 18 in. x ⅝ in. cover plate;
One 120 in. x ⅝ in. web.



Layout of Plate Girder Bridge; Milwaukee, Sparta & Northwestern.



Crossing of Prairie du Chien Division.

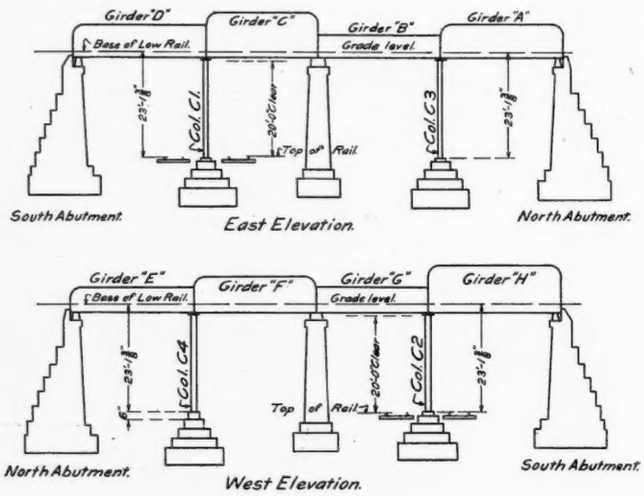
The floor troughs in the section between girders H and C, which are illustrated herewith, are typical of the design used. Gusset plates from girder stiffener angles and auxiliary vertical angles, which are riveted to the girder web, support floor beam troughs. The floor beam troughs have the following section:

Two top cover plates, 10½ in. x 9/16 in.;
Two top angles, 6 in. x 3½ in. x ⅝ in.;
Two web plates, 26 in. x ⅞ in.;
Two bottom angles, 6 in. x 4 in. x ¾ in.;
Two bottom cover plates, 12½ in. x 9/16 in.

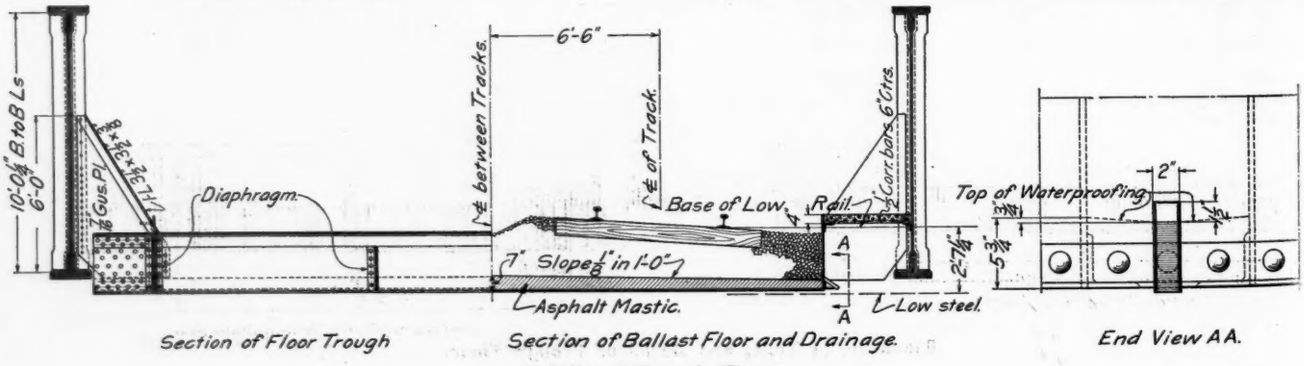
Ballast girders, built up of a web plate 35 in. x 7-16 in. and a top and bottom angle 5 in. x 3½ in. x 7-16 in., are set between these floor beam troughs parallel to and 3 ft. 4 5-16 in. inside of the center line of the main girders. To these ballast girders are riveted the secondary troughs, 4 in. x 4 in. x 7-16 in. angles being used for the connection. These troughs have the following section:

One top cover plate, 10½ in. x 11/16 in.;
Two top angles, 3½ in. x 3½ in. x ⅝ in.;
Two web plates, 18 in. x 7/16 in.;
Two bottom angles, 4 in. x 4 in. x 11/16 in.;
One bottom cover plate, 12½ in. x 11/16 in.

All up troughs are filled with asphalt mastic to a depth of 7 in. and the surface sloped ⅛ in. to 1 ft. to drains at both ends of the troughs. Stone ballast is laid over this mastic and dressed

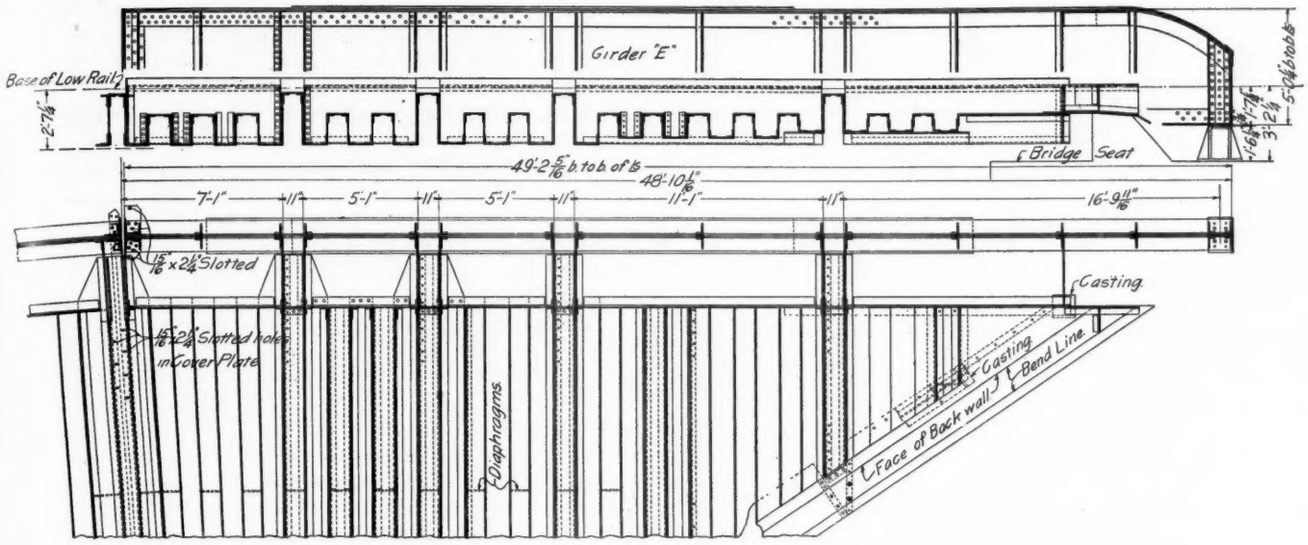


Elevations of Girders.



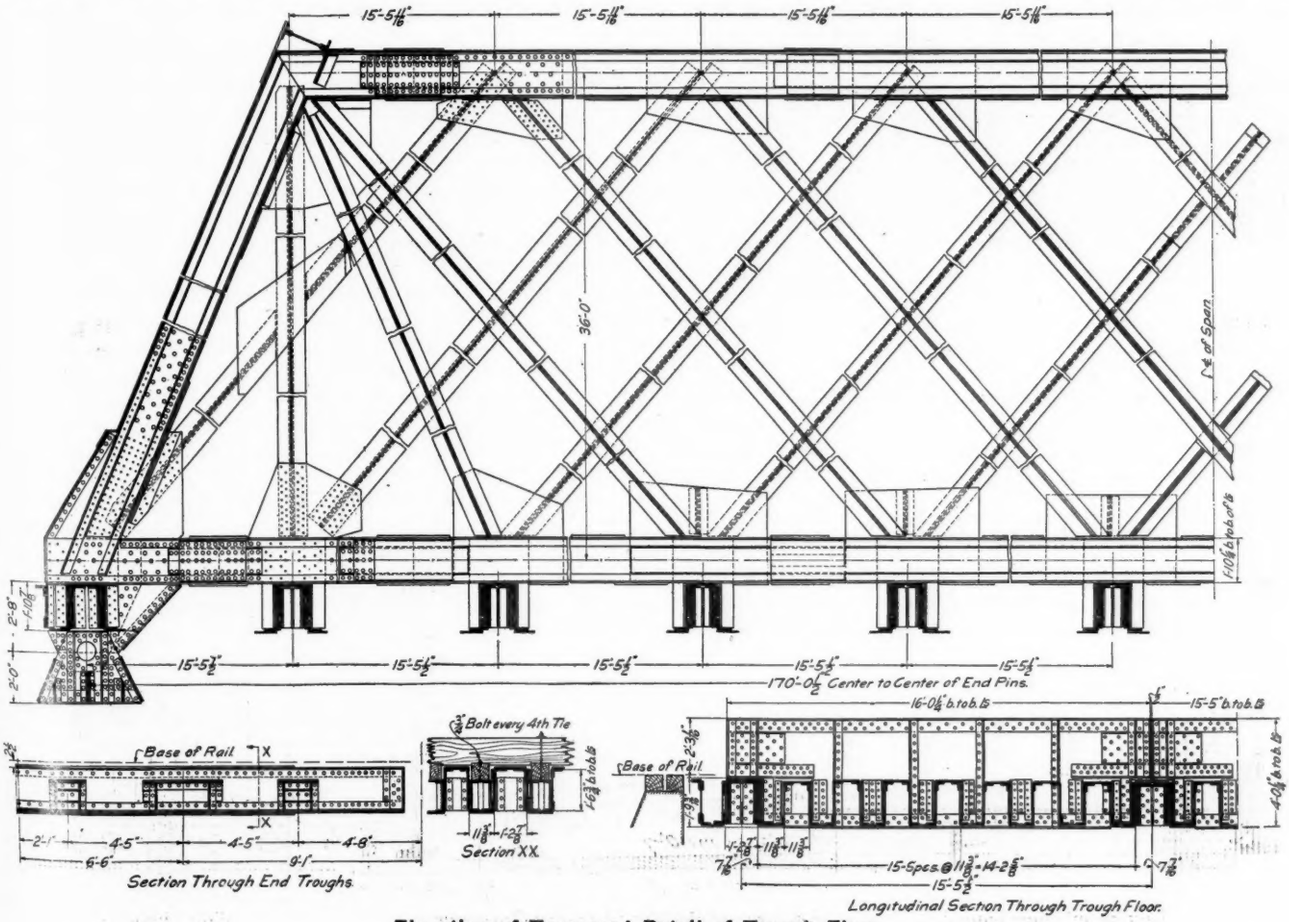
Details of Trough Floor.

to the section shown. The trough spacing is 13 in. and 11 in., center to center of web plates for up and down troughs, respectively, and ties are spaced 2 ft. center to center, being arranged to come directly over the up troughs. Concrete slabs 4 in. thick reinforced with ½-in. corrugated bars placed transversely on 6-in. centers are provided to cover the open spaces between the main girders and the ballast girders. These slabs rest on the upper angle of the ballast girder and shelf angles riveted to the web of the main girder.



Details of Girder and Floor Connections.

The sections of girders and troughs in other parts of the structure vary from that given above, due to differences in loading and span lengths, but the essential features in all cases are the same. The troughs that are supported on an abutment or pier are carried on castings similar to base castings, which are planed top and bottom. At expansion joints, troughs are provided which have the connection of top cover plate to top angles made by ⅞ in. round bolts in holes slotted to 2¼ in. The holes are covered under the nuts by 2½ in. x ¼ in. washers. On the pier the space between the castings supporting the troughs was filled with concrete level with the top of the castings before the steel was erected. The intermediate columns are braced by top and bottom struts and diagonal bracing, one column of each pair


15'-5 11/16"
36'-0"
℄ of Span
15'-5 1/2"
170'-0 1/2" Center to Center of End Pins.
Base of Rail
3/8" Bolt every 4th Tie
Section XX.
Section Through End Troughs.
16'-0 1/2" b. to b. Ts
15'-5" b. to b. Ts
15-5 pcs. @ 11 3/8" = 14-2 5/8"
15'-5 1/2"
Longitudinal Section Through Trough Floor.

Elevation of Truss and Detail of Trough Floor.

being arranged to slide on a phosphor bronze plate to care for expansion.

The John Marsh Construction Company had the contract for all excavation and masonry work on this section; Gindele & Company built all buildings in the shop group except the coal chute, which was erected by Fairbanks, Morse & Company, and the Alphonse Custodis Chimney Company had the contract for the stack. All this work was planned and carried out under the immediate supervision of E. C. Carter, chief engineer of the Chicago & North Western, with the following organization: W. H. Finley, assistant chief engineer; J. F. Stern, engineer of bridges; D. Rounseville, resident engineer; and W. A. Brewer, assistant engineer in direct charge of the work in the field.

REBALLASTING BY CONTRACT.

The Michigan Central has for the past three years been doing stone ballasting by contract, which has proven entirely satisfactory as to the amount and quality of work done, and a considerable saving has been effected over the cost of similar work done by company forces. Since the only available labor is Italian, the contract was let to an Italian who had been in the service of the company for a number of years, supplying labor for track work. This man had always dealt honestly with both the railway company and the men, and, although he knew nothing of stone ballasting, it was found that he could secure from his own countrymen more and better work at a less cost than could the company by employing white foremen with the usual interpreters. There has been no labor trouble whatever since adopting this method, the contractor being able to handle all the stone furnished by the quarry with a much smaller force than was required by the company when doing the work themselves.

Under the terms of the contract the company prepares the track to receive the stone, by skeletoning out the old ballast, spacing and replacing the old ties, applying anti-creepers and distributing the stone. After the stone has been distributed the contractor is responsible for the condition of the track until accepted by the inspector. In connection with the stone ballast considerable work has also been done in raising small sags to improve the grade line before making the lift on stone.

The company's forces consist of two gangs of between 20 and 30 men, one gang being used for skeletoning out and the other for spacing and renewing ties. Both gangs are combined into one when any considerable length of track is to be lifted on gravel or cinders. Where track is lifted before receiving the stone it is necessary to do but very little skeletoning, and the two gangs work together lifting and renewing and spacing ties. At the time the track is skeletoned out, all swings in the alinement are taken out.

The contractor's force consists of from 35 to 50 laborers, divided into two gangs, with two foremen and an assistant foreman, one foreman and twelve men being used almost continuously picking up rough spots and lining behind the lifting gang.

The specifications under which the work is done require that the track be lifted in such a manner that after a lapse of three days it will require a second lift of not more than 2 in. nor less than 1 in. to bring the track to the grade of the stakes. On the first lift the ties are tamped with spades, which are found to be more satisfactory for this work than the ordinary shovel. After this lift has been under traffic for at least three days it is given a surface lift of from 1 in. to 2 in., lined to stakes, and trimmed to the standard ballast section.

The contractor, at a price of 3 cents per ft. for lifting and 5 cents per ft. for lining, surfacing and trimming, makes a reasonable profit, and the company saves about as much as the contractor earns. The price of 3 cents per ft. for lifting is for any lift of 8 in. or less, and ¾ cent per ft. is paid for each inch over 8 in. up to 10 in. It is intended to give the track at least a 6-in. lift, and very little is lifted over 8 in. Contractor's and company's laborers are paid $1.60 per day, foremen $75 per month, and the inspector $85 per month.

Both the contractor's and the company's foremen are subject to instructions from the inspector, who is selected from the regular foremen and is generally one who is very familiar with stone ballasting work. When the contractor finishes a mile of track it is carefully looked over by the inspector and if, after riding over it, he finds it up to specifications, it is accepted and the contractor is relieved of further responsibility.

WORK TRAIN FOR HANDLING TRACK MATERIAL.

A special work train with a small extra gang has been employed for several years on the Aurora division of the Burlington for loading and unloading all track material for construction work, as well as relaying rail. This division is a very busy one, and each year there is a great deal of miscellaneous construction work of various kinds which requires the handling of a large amount of track material. The old way was to have the way-freight load or unload it with the aid of several section gangs, to avoid calling out extra power. After the recent federal legislation, especially, it was found that this work could not be handled economically in this way, so a special work train was put on at the beginning of the season. All material for construction or renewal work on various parts of the division is handled by this train and gang, and their use has been found to result in greatly decreased interference to tracklaying and section gangs. Rails, ties, splices and bolts, etc., are unloaded systematically and promptly, and it is possible to complete arrangements for track work far enough in advance to eliminate the frequent waiting for material. This advantage was also found in picking up second-hand rail, in supplying mills for sawing, and in redistributing this rail for use on the line. In addition to the service for construction gangs, the outfit is useful in filling bridges, unloading odd lots of ballast, and cleaning up scrap on the main line where traffic is dense.

The main result of the use of this train is the saving of time lost in collecting large forces of track laborers, and the more rapid performance of track work on account of material being on hand ready for use. There is a further economy in the use of such a train on a large division where small roundhouses are maintained at junction points, as the outfit can be laid up at the most convenient point and avoid the time of running into headquarters, as was necessary where the train was called out for but one day at a time.

The outfit used on this division consists of an engine, way car, tool car and bunk car, with a gang of 12 men in charge of the work train conductor. The conductor selected for this work is a man experienced in accounting and rendering reports for all material loaded and unloaded. Being on this train from season to season he becomes familiar with the requirements of maintenance work and in this way simplifies the distribution of material.

We are indebted for this information to W. S. Kirby, superintendent of the Aurora division, under whose supervision this train has been in operation.

The track elevation department of the city of Chicago has issued a report covering the period since January, 1909, which shows that the total mileage of track elevation work covered by ordinance to June, 1911, has been 140 miles of roadbed and 843 miles of track. It is also estimated that 192 miles of roadbed and 1,265 miles of track remain to be elevated which are not yet covered by city ordinances. The principal work under way at the present time is that extending from Grand Crossing southeast through South Chicago, elminating the complicated crossing at Ninety-fifth street, South Chicago. The plans for this work were described in the *Railway Age Gazette* of March 24, 1911, page 758. The report is signed by Francis J. Owens, commissioner of track elevation.

BRIDGE AND BUILDING CONVENTION.

The twenty-first annual convention of the American Railway Bridge and Building Association was called to order at the Planters' Hotel, St. Louis, Mo., October 17, by President Rettinghouse. J. N. Penwell (L. E. & W.) offered prayer. John H. Guldlach, president of the St. Louis City Council, welcomed the convention to the city in the absence of the mayor. George Andrews (B. & O.) replied for the association.

In his address President Rettinghouse paid a tribute to the early founders of the association in St. Louis twenty years ago and pointed with pride to the record of work done and to the standing of publications. He urged new members to take part in the discussion and also pointed out that it was necessary for members to limit their remarks strictly to the subject under discussion. He called attention to the increase in membership from 60 charter members to 143 members in 1900 and 475 today.

The membership committee reported 90 new members. The treasurer's report showed a balance of $1,311.

The following are abstracts of the committee reports and the discussions on them:

FIREPROOFING FOR TIMBER TRESTLES.

The types of fireproofing used mostly at the present time are as follows: (a) Ballasted floor pile bridges, about the same amount of ballast being placed under the tie on the bridge as on an embankment; (b) metal covering on ties; (c) ballast covering from 2 to 4 in. thick on the ties, a wood filler being placed between the ties to support the ballast; (d) metal covering on the caps and stringers; (e) metal covering on the ties, with 2 in. of ballast thereon; (f) ordinary pile bridges built with certain kinds of treated timber; (g) fire-resisting paints; (h) pile bridges having I-beam stringers.

The fireproof feature of ballasted floor timber trestles is not the most important reason for adopting this type of construction, so it is not gone into in any detail in this report. Such bridges with treated timber cost about 75 per cent. more than the ordinary pile bridges.

The method of entirely covering the ties with metal is favored by many roads. It affords very good protection when the sheets are firmly attached and in good condition. If the metal used is of a poor quality and light weight, holes will soon develop, and if not properly fastened it will work loose and the ends will curl up, assisting ignition, rather than preventing it, by affording opportunity for the lodgement of sparks.

Ballast covering over the entire deck affords a good protection. A very serious objection is that the ballast holds the moisture and causes decay of the timber. The position of the filler blocks between the ties is important. The two extremes are placing them flush with the top of the ties and placing them directly on the stringers. In the first case the gravel will readily move about, due to the vibration of the trains, while in the latter case a large surface of the timber is exposed to the action of moisture. Probably the best way is to place the fillers so that the tops will come about 1 in. below the top of the tie.

Galvanized iron is placed on the top of caps and stringers by a number of roads, the object being to protect the timber from weather as well as from fire. Fire-resisting paints are used to a considerable extent in the New England States and in Canada with good results in most cases.

Summary of 44 Railways, Showing Number on Which Each Type of Fire-Proofing Is Used.

Types Used.	Number of Roads Using.
A	24
B	8
C	15
D	18
E	1
F	1
G	6
H	1

Summary Showing the Types of Fireproofing Used on 44 Railways.

Types Used.	Number of Roads Using.
A	6
B	2
C	3
D	5
G	4
A and D	6
A and H	1
A and C	6
A, B and D	2
A, B and C	1
A, G and F	1
A, C and D	1
B and C	1
B, C and E	1
B and D	1
C and D	2
D and G	1

The conclusions were as follows:

Most railways favor the ballasted floor pile bridge because it has many desirable qualities as well as being fireproof.

The protection of the timber from the weather is probably as much the reason for using type D as the fireproof feature.

Types F and H are used because with them a bridge is more permanent than the ordinary timber trestle, hence does not need so many repairs.

Types B, C, E and G are used solely to protect bridges from fire, and since type E is merely a slight modification of type B, there remain only three types used exclusively for fireproofing.

With the use of types B and C, inspection and repairs are more difficult to make than ordinarily, and this is quite important on timber structures; also when type C is used a more rigid inspection is necessary and more repairs will be needed than otherwise.

Type G is very simple and does not change the general construction of the bridge in any way. Another thing in its favor is the comparatively low cost. There is, however, some doubt as to its effectiveness, but a thorough test made under actual working conditions ought to determine whether a fire-resisting paint is practicable to use for fireproofing timber trestles.

Committee: Lee Jutton (C. & N. W.), W. H. Moore (N. Y. N. H. & H.), J. C. Nelson (S. A. L.), R. J. Arey (A., T. & S. F.).

Discussion.—A. E. Killam (Intercolonial).—Twenty per cent. of fires are caused by dropping sparks in rotten sap wood at the corners of timbers. In many cases we have cleaned off the sapwood, resulting in a structure lasting three or four years longer. Trackmen do not realize the danger of this unless they are specially instructed.

J. S. Robinson (C. & N. W.).—Our superintendent of motive power says that the trouble is due to the type of firebox approved by the government. We are now placing fence boards on ties inside and outside the rail on some bridges, and covering with 3 in. of clay near the rail and with 4 in. at the center of track. We find it makes the floor practically waterproof as well as fireproof. It costs not over 37½ cents per lineal foot.

Mr. Penwell.—Protection should begin at the ground, with the clearing away of brush by section forces. Rotten timber in a structure is a firetrap and should be removed. Placing clay or gravel on a bridge shortens its life. Using paint lengthens the life of a trestle, and the only objection is the whitewashed appearance it is given.

C. Smith (M. P.).—Ninety-five per cent. of fires start from the top. Protection insures a 50 per cent. increase in the life of timber and nets 15 per cent. on the investment.

G. Aldrich (N. Y. N. H. & H.).—Galvanized iron does not last over two years near salt water, so we use zinc. We have used whitewash as a fire preventative; it increases the life of timber 20 per cent.

B. Pickering (B. & M.).—Painting is the only satisfactory method. A Boston & Maine bridge, painted one year ago, caught fire where it was not painted and it burned so slowly that little damage was done. The bridge was double track, 175 ft. long. I

would recommend covering caps and stringers with sheet iron and painting ties.

Mr. Jutton.—Tests made by the engineer of tests of the New Haven show that creosote burns fiercely and greatly aids fire.

J. H. Markley (Tol., P. & W.).—It is old bridges which catch fire. We never cover the bridges where there are stringers only until they are one year old.

Further discussion was postponed, as a test of fire resisting paint was planned at the Missouri Pacific trestle at Crewe Coeur lake, 22 miles west of St. Louis. This test was made the next day, 150 members attending in a special train. The bridge is 138 ft. long and 8 ft. high. It was painted with one coat of Clapp fire resisting paint, applied by company forces on the tops of ties, stringers and caps, and on the sides of ties. An engine was run twice over the bridge, dropping live coals, and coals were also placed on the stringers. No damage was done. A pile of ties previously painted with the Clapp paint was covered with straw and fired without damage.

At a later session of the convention, discussion on this subject was resumed, as follows:

Mr. Jutton suggested that the association decide what kinds of fire proofing it favored and that the committee continue this subject for another year, perhaps preparing specifications for different types.

Mr. Fake. I would like to see various trestles painted with paint and other protection and compared with unprotected structures.

Mr. Penwell.—I would like also to see tried a structure treated with whitewash.

Mr. Jutton.—Type G in the report refers to any liquid coating or whitewash.

Mr. Fake.—I believe that paint should not be applied with a brush. Timbers should be painted before framing, as fire originates in joints.

J. Thorne (C. B. & Q.).—In the spring of 1889 we built a trestle across the Rock river, near Rock Island. Partly as an experiment, we applied salt on all ties. Many fires started, but they never crossed the salt. The last piles were removed in 1910, being in good condition. Another pile trestle, now eleven years old, is in good condition, as shown by a recent examination. German experiments rate salt as second among preservatives, as well as being a good fire protection.

The committee was continued for another year and instructed to conduct necessary tests to enable conclusions to be reached.

DERRICKS IN MATERIAL YARDS.

Chairman Penwell asked that the subject be continued for another year. Only a progress report was submitted. The committee was unable to secure sufficient data as to derricks used in yards only. Many sent in data covering derricks used in both yard and field work. The report was referred back to the committee.

BEST METHOD OF NUMBERING BRIDGES.

In preparing this report a letter was sent to a large number of officers in charge of the bridge departments of the various railways, asking what method they considered best for numbering bridges and what was the practice in use on their lines. A study of the information received in reply to this letter showed that:

First.—At the present time the number of roads using the mileage system is somewhat, but not greatly, in excess of the number using the consecutive numbering system.

Second.—Where changes are being made they are made from the consecutive numbering system to the mileage numbering system.

Third.—The consensus of opinion seems to be that with a new line where a scientific system can be put in at the start the mileage system is preferable.

Fourth.—The mileage system seems to present some difficulties if applied to a large road with many main lines and branches.

Fifth.—Where the consecutive numbering system is in use on an old-established line of considerable mileage and many branches, it seems advisable to keep this system. The cost of the change is almost prohibitive. All officers of the road know the important bridges by their numbers, so that changes would cause endless confusion, and for a considerable time bridges would be known by either one of two widely varying numbers.

Sixth.—It has been urged against the consecutive numbering system that it gives no indication as to the location of the structures. This is largely overcome by having a proper record of bridges in the office of record, showing the stations and the mileage and indicating the numbers of the bridges in their proper relative position to these stations and mile number-posts. The consecutive numbering system is in use on the Chicago & North Western and on practically all other roads of any size. When a report comes in from the field with regard to a bridge, stating the number, the report is immediately sent to the bridge department, where the bridge record books are kept, and advice can be instantly given to the general officers, stating just where the bridge is, with reference to the stations, on that particular line. This does not locate the bridge closer than between two mile-posts and between two stations, but this is as close as can be asked from any system.

The committee did not believe it advisable to recommend any particular system of bridge numbering at this time. The matter has been discussed to a very considerable extent, and there are today advocates of the consecutive system as well as of the mileage system of bridge numbering, although the former are in the minority. It is not believed that the association should introduce any particular system or go on record as advocating one particular system and that only.

Committee: I. F. Stern (C. & N. W.), E. B. Ashby (Lehigh Valley), W. H. Wilkinson (Erie), C. N. Monsarrat, William Graham, R. H. Reid (L. S. & M. S.).

Discussion.—W. H. Moore (N. Y. N. H. & H.).—Within the past few years we have changed from consecutive to mileage numbering We believe there are great advantages in the latter method. Much objection was made to the change before it was made, but no confusion arose. We would not think of going back to any other system. We always made the number zero at the connection with the main line and defined the bridge by naming the branch.

J. T. Andrews (B. & O.).—Until last year we favored the mileage system. Within the past few years we have made much realinement, causing confusion. Now the most favored plan is the consecutive numbering by hundreds, starting No. 1 at each division terminal and numbering consecutively, each division having different hundreds. The plan on one division is to number bridges by miles and tenths; any new bridge inserted can then be numbered by the mile and hundredth.

G. Aldrich (N. Y. N. H. & H.).—When we first started mileage numbering I was opposed to it, but now I like it. Any timecard identifies the bridge when the mileage number is shown. It is very easy to number additional bridges.

BUILDINGS AND PLATFORMS FOR A SMALL TOWN.

At the meeting last year this subject was referred back to the committee for further consideration, there having been some criticism of that part of the report in regard to the tracks back of the depot and the elevated plaform. The report last year said that "for stations where but a small amount of freight is handled a house track back of the staion is not desirable. Where, however, a large amount of freight is received, as is occasionally the case in small towns and on busy roads, and where considerable time would be lost by local freight trains getting out of the way of other trains, a track back of the station is desirable."

It was not intended to make this a general standard, but to be used in cases where considerable quantities of freight being received could be unloaded while waiting for other trains to pass. If such conditions do not exist the committee does not recommend the layout.

Concerning the platforms, general conditions must govern. If heavy freight is received a high platform of proper size is usually desirable. At some small stations large quantities of cotton, broom corn, oil in barrels, ore, etc., are received for local shipment. In such cases an elevated platform would seem a necessity. They should be placed as conditions would seem best for transferring from wagons to cars, or vice versa, and far enough from other buildings so as not to endanger them in case of fire.

For the above reasons the committee did not see its way clear to change its last year's recommendations and submitted the following conclusions:

(1) Passenger stations and combination passenger and freight stations with their platforms should be contiguous to and face the main track.

(2) Where but a small amount of freight is handled, platforms level with the car floor are not generally desirable. Where a considerable quantity of heavy freight is handled, platforms at or nearly the height of the car floor are desirable. Such platforms may be adjoining the station building or at a distance from it contiguous to a team or unloading track, as conditions require. When they constitute a part of the depot platform they should not in general extend nearer the main track than the front line of the station building and in no case nearer than 8 ft. of the main track rail.

(3) Grain elevators, oil houses, cotton, broom corn or other platforms or buildings storing inflammable or semi-inflammable merchandise should be located, as far as practicable, so as not to endanger railway or other property.

(4) Section tool houses should, where practicable, be located adjacent to the main track and preferably outside of side track limits.

Committee: C. H. Fake (M., R. & B. T.), N. H. LaFountain (C., M. & St. P.), H. M. Jack (I. & G. N.), B. F. Beckman (F., S. & W.), O. H. Andrews (St. J. & G. I.), R. J. Bruce (M. P.).

Discussion.—Mr. Penwell.—If this track can be put in without placing additional switches in main track I favor it.

Mr. Fake.—It may happen that it becomes advisable to place another switch in the main line to save the time of trains.

BRICK VENEER FOR STATION BUILDINGS.

The committee sent out a letter to members of the association and others, asking what results they had secured from using brick veneer for station buildings. It seems from the replies received that very few roads use brick veneer to any extent for this purpose, and a large number advise that they have not had any experience with this type of structure. Three members of the committee have had no experience with brick veneer, and one who had some experience has had considerable trouble with the veneering jarring loose from the wood sheeting and around the window and door frames, on account of the vibration and general severe service a station building has to stand.

Taking into consideration the cost of lumber and the additional expense for a suitable foundation which would stand the vibration caused by the passing of high-speed trains, the saving in the cost of brick veneer over a solid brick structure would not justify veneering.

A number of men questioned if such a structure would be suitable for station buildings at outlying stations where there is much vibration from trains passing at high speeds, and believed that the only way this trouble could be overcome would be to build permanent and expensive foundations. This brings up the question of the advisability of placing a brick veneer building on an expensive foundation.

Concerning fire protection, it is not considered that brick veneer is of great benefit, as but a small proportion of the fires damaging or destroying buildings start from sparks lodging in the outside walls.

The consensus of opinion in these letters is that with the present high price of lumber, a brick veneer building on solid foundation will cost very nearly if not equally as much as a structure built entirely of brick.

Brick veneer buildings have been built by the Toledo, Peoria & Western at Sheldon, Watseka and Washington, Ill.; by the St. Louis, Iron Mountain & Southern at Beebe, Ark., and by the Chicago, Milwaukee & St. Paul at Edgerton, Wis. The Chicago, Burlington & Quincy, after watching the endurance of one built at Plattsmouth, Neb., is now building brick veneer depots at Walthill, Alma and Harvard, Neb.

Committee: M. E. Gumphrey (C. R. I. & P.), J. D. Moen (C. & N. W.,), W. Beahan (L. S. & M. S.), R. O. Elliott (L. & N.), W. A. Conkling (U. P.).

Discussion.—Mr. Killam.—We have twenty or thirty veneer building, but they are not satisfactory. We now use timber or solid timber. We often have to tear part of a wall out to repair timber near the wall. The present cost of brick is but little more than veneer. We have not built of veneer for the last twenty years.

Mr. Markley (T. P. & W.).—Our buildings are on concrete and rock foundation.

P. J. O'Neill (L. S. & M. S.).—We can build brick wall plastered on the brick inside cheaper than a veneer building lathed and plastered.

Mr. Markley (T. P. & W.).—We are now building a station of veneer with beaver board inside instead of plastering.

Mr. Markley (C. &. E. I.).—One should have solid wall up at least five feet to withstand the knocks received in unloading freight.

Mr. Rettinghouse.—Any wall should have protection guards. I do not believe that the difference in cost warrants the adoption of veneer.

Mr. Markley (C. & E. I.)—My objection to a veneer building is that it means too much combustible material.

The committee's report was received as information, and the subject was continued for further report next year.

ROOFS AND COVERINGS.

As a general proposition, roofings suitable for use on railway structures may be divided into five classes. First, built-up roofs surfaced with gravel, slag or similar material; second, built-up roofs surfaced with tile or brick, set in plastic material or cement mortar; third, built-up roofs without gravel, slag or tile surface; fourth, prepared roofings, either smooth or with a sanded or pebbled surface; fifth, overlapping tile, slate or cement shingles, and galvanized iron. Galvanized iron should not be used on a roof incline of less than six inches to the foot. Built-up roofs give the best value on flatter inclines, but should not be specified where the incline exceeds two inches to the foot unless the contractor is thoroughly familiar with them. The use of tarred felt and coal tar pitch in built-up roofs has proven its value by long service. Poor roofs of this type are due to the material not being coal tar pitch or being improperly applied or used in too small quantities. Tile or brick roof increases the cost four to six times, and the life is practically the life of the structure. Prepared roofings have the defect that because of being in only one layer a single defect causes a leak. Overlapping tile, slate and shingle roofs are advisable for inclines in excess of six inches to the foot.

It is practicable to apply any fairly smooth wooden deck, except as the roof incline has a bearing on a built-up deck. With decks of concrete or tile, there must be some provision for nailing. This is usually provided by wooden nailing strips when the deck itself cannot be nailed into. The smaller the building, and the greater the distance from the base of operation, the greater is the advantage of prepared roofing. Grit or pebble surface on prepared roofing permits the use of more waterproofing material on the surface and protects it from erosion.

Discussion.—Maurice Coburn (Vandalia; chairman Roofing committee of the American Railway Engineering Association)—The manufacturers formerly kept all information regarding roofings to themselves, and the railways knew very little. In built-

up roofs, it is necessary to select between coal tar and asphalt. Coal tar is cheaper than asphalt in first cost and in application. Asphalt is an uncertain proposition and requires more skill in application. Coal tar is not good for ready roofings, for coal tar felt gets brittle more quickly than others. It is necessary to have a mixture of several different asphalts and flux with oil to get results. No one asphalt is good of itself, for the oil separates and goes back into the felt. It must be mixed by experienced men.

H. A. Horning (Mich. Cent.)—The particular design of the building usually governs the kind of roof to apply. I favor tile over slate for ornamental purposes, although it is slightly more expensive. We use prepared roofing on small buildings in inaccessible locations. We have never used it in a passenger station, where appearance is essential. The question is not solved with them.

The president invited roofing salesmen to speak, and Mr. Waddell (Johns-Manville), and Mr. Sibley (Barrett Manufacturing) gave short instructive talks.

Mr. Markley (C. & E. I.)—In our practice we resurface gravel roof by applying more pitch and gravel. We never place new felt over old felt.

Mr. Robinson (C. & N. W.)—We placed prepared roofing on the Wells street station fourteen years ago. It gave a very hard surface. We removed the roof recently and found it in very good condition. We have difficulty with coal tar, the pitch dripping at suburban stations and at shop buildings. We have used tar mixed with pitch, probably causing dripping. However, we used coal tar pitch in 1894 on sheds and got very good service; they have been coated once. We use slate roofs on the Chicago shops, built in 1871. Where copper nails were used, results were good. Repairs were necessary where galvanized iron nails were used. Tile roofs have been successful.

Mr. O'Neill.—There can be considerable dripping with coal tar. We have had difficulty with a roof over a boiler room, which dripped for nearly a year.

The report of the committee was received as information and the subject was continued for another year.

REINFORCED CONCRETE TANKS, STAND PIPES AND RESERVOIRS.

The average life of a wooden tank may be taken as about 18 to 20 years, depending upon the kind of lumber used, care used in construction and the attention given to it, such as keeping it filled with water, not allowing the water to freeze, keeping the outside of the tank painted, etc. The hoops also need constant attention, and in many cases have to be changed once or twice during the life of the wood. On account of these difficulties other materials have been given consideration. Many steel tanks have been built and are the standard of some railways, such as the Lehigh Valley. This style of construction is most frequently used for the larger size tanks of, say, 100,000 gallons and over.

The principal arguments to be made in favor of reinforced concrete water tanks are: (A) the required materials can easily be obtained in almost any locality and the experience gained with each tank built gradually decreases the construction cost; (B) the concrete tank need not necessarily be kept filled with water in order to preserve it; wooden and steel tanks rapidly go to pieces by being alternately wet and dry; (C) it is easily kept clean regardless of the kind of water it holds because nothing is absorbed by the concrete; (D) there are no maintenance charges; wooden and steel tanks require painting, calking, renewal of hoops, etc.

The foundation must be carefully planned, but the same is equally true of wooden and steel tanks. The details will depend entirely on the location and must be redetermined for each individual case. The argument has been advanced that uneven settlement will do less harm to the superstructure of a properly designed reinforced concrete tank than to a wooden tank, but this is no reason for putting in a poor and insufficient foundation.

The design of the superstructure varies considerably and to some extent is governed by the use to which the tank is to be put. In a general way there are three designs: (A) a cylinder or prism resting on concrete footings and used for its entire height as a water reservoir; such a tank is used where the quantity of water is the main consideration or where the tank is located on an elevation. (B) a cylinder or prism resting on concrete footings having a diaphragm or partition a considerable distance above the footings that form the bottom of the water reservoir. This design is used where elevation is needed to obtain sufficient pressure for hydrants or water columns and where the hydrostatic pressure if brought to the base of the tower would be likely to cause seepage through the concrete. The lower portion of the tower can be provided with suitable openings and utilized for pumping machinery and the storage of tools. In case of trouble during severe winter weather a tank of this design can be thawed out without risk. (C) a tank of concrete resting on reinforced concrete posts similiar to a wooden or steel tank on the tower. Design C is used the same as B without the frost-proof feature.

A railway tank should be provided with a roof which may be of concrete, wodo, tile, slate or prepared roofing, as desired.

The railways of the country are giving more attention to the appearance of their buildings and grounds. Reinforced concrete lends itself very readily to artistic design and this will be no small argument in favor of the concrete tank.

There are several reasons why railways have not taken up the construction of reinforced concrete tanks more generally. In the first place, because of the comparatively few structures of this kind that have been built, the work up to the present time has been largely experimental. Railways that have to contend with severe cold weather do not care to try such tanks until they are sure they will stand freezing weather without injury. Because of constantly changing operating conditions and requirements the permanent location of many tanks must necessarily be more or less uncertain. Lack of experience in this form of construction makes the labor charge run high.

The report describes in some detail a number of stand pipes and tanks recently erected in this country, and concludes with a bibliography of literature on this subject. Among the railway tanks described are: One on the Pennsylvania at Austinburg, Ohio; two on the Southern Railway on Ooltewah and Bull's Gap, Tenn.; one at Empalme, Sonora, Mexico, on the Cananea, Yaqui River & Pacific and one at Savannah, Ga., on the Central of Georgia Railway.

Committee: F. E. Weise (C. M. & St. P.), G. H. Soles (P. & L. E.), C. W. Richey (Penna. R. R.), W. H. Vance (La. & Ark.), D. G. Musser (Penna. Lines).

Discussion.—Mr. Weise.—The concrete tank costs more than the wood or steel tank, but the maintenance charges are reduced to a minimum. However, it was not advisable to include cost figures in the report, as they vary with individual cases.

Mr. Strauss (B. & O.).—The tank on the road, described in the report, has not leaked, but it has sweated considerably, discoloring the outer surface. In construction, the only effort to bond one section to another was to clean the surface with hydrated lime. The water was not turned in for 30 days. Several small leaks developed, but it soon became substantially watertight. Moisture did not appear at the joints more than elsewhere.

J. B. Sheldon (N. Y. N. H. & H.).—Very fine sand sometimes has voids of 50 per cent., while a coarse sand may have voids as low as 10 per cent. One should know the class of sand used.

Mr. Strauss.—We used No. 3 sand, secured locally. It was really glass sand. It was crushed and washed, with a large percentage of fine particles.

Mr. Weise.—The proportions vary because local material is used. The thickness of the walls in the designs submitted vary greatly.

Mr. Markley (C. & E. I.).—I would make the concreting continuous until the tank is complete, without joints.

Mr. Strauss.—Continuous poring might apply to shallow tanks, but I doubt its advisability for high tanks. I am satisfied that we would secure poor results in a big tank poured from the top continuously. Experience in concreting girders has showed that

material segregates in dropping 10 ft. This tank construction is cheapened by the use of steel forms.

Mr. Markley (C. & E. I.).—I meant to pour three or four sections vertically until completed.

Mr. Strauss.—The subject of small cracks and the effect on reinforcement was not studied. Cracks were so small they were hardly found. It was not thought that enough water reaches the steel to do harm. There is a chance of small pockets forming along the steel, resulting from poor workmanship.

Mr. Rettinghouse.—We designed a tank for an industrial concern 24 ft. in diameter, 30 ft. in the ground and 30 ft. high. It was reinforced above ground only.

The subject was continued for investigation next year.

BEST AND MOST ECONOMICAL PUMPING ENGINES.

The committee gave this subject a considerable amount of study and conducted a number of tests and investigations, but it did not feel that it was in the position to recommend the best and most economical pumping engines for general use for the reason that a proper and complete report in this connection would mean a recommendation for each and every condition encountered in railway water service, and the number of such conditions are very numerous. Instead of making a report strictly in accordance with the subject in hand, the committee considered that the report would be of greater value if it included a number of tests with different types of pumping units. Such tests were made and reports presented by the committee. Data was submitted which had been gathered from water stations where reliable figures could be obtained as to the amount of fuel consumed and water pumped resulting from actual weight and measurements of fuels, reading of meters, etc. The points selected where the tests were conducted were such as are commonly found in railway service, and the same results may be secured at any station where similar conditions exist. All of these tests were reduced to cost per water horse power per hour, and in each instance the cost of fuel was given, which can be used as a basis for fuel at any other figures.

The committee submitted this report as a progress report and suggested that such tests and investigations be continued.

Committee: C. E. Thomas (I. C.), J. Dupree (S. I.), G. H. Jennings (E. J. & E.), R. A. Luker (G. C. & S. F.), J. B. White (C. & N. W.).

Discussion.—Chairman Thomas urged that the report be continued for another year, and said that two roads were changing from gasolene to power distillate, the cost being three cents a gallon as against twelve cents for gasolene, with the same power.

The subject was continued for another year.

EMBANKMENT PROTECTION.

The committee on embankment protection submitted as a report a number of letters by members of the association and United States government officials, describing methods of protecting embankments used under their supervision.

The Lake Shore & Michigan Southern uses heavy breakwater stone where they have heavy washing and pounding of the waves, such as along Sandusky bay. This protection is sometimes supplemented by filling in between the breakwater stone with smaller stone which can be handled by hand or plowed off the cars. Another kind of protection used is barbed wire or woven wire fence, which is spread along the embankment and filled in with underbrush or other material so as to form a mat. In other cases heavy underbrush is placed on the embankment and covered over with lighter material which will interweave with it and form a solid mat. Piling has also been driven at dangerous places.

A method used on the Southern Pacific was described by C. F. Green in the issue of the *Railway Age Gazette* of July 21.

On the Fort Worth & Denver City rubble stone is placed in shingle fashion for about 30 cents per square yard, and is forming an efficient bank protection. Along river banks cribs about 10 ft. wide are built extending out into the stream at an angle of about 30 deg., and pointing down stream. These cribs have sand bars back of them to prevent future trouble. Barbed wire fences have also been placed along the bank at several points but without entire success. It is expected that concrete slab protection will be placed at several points along the line in the near future.

Information was included from a report of the chief engineer of the Mississippi river commission regarding the weaving and sinking of a fascine mattress at Delta Point, La., opposite Vicksburg, where the river bank is caving in and endangering the tracks of the V. S. & P. R. R. Figures are given which show that the mat was costing $27.78 per lineal foot, or about $25,000 for 900 ft. of revetment.

A report, together with plans and photographs, of the Keer Gabin system for protecting embankments and controlling channels at a nominal cost was also attached. This method is attracting considerable attention today.

Committee.—E. L. Loftin (Q. & C.), P. W. Cahell (S. A. L.), C. H. Eggers (C. R. I. & P.), J. M. Mann (Ft. W. & D. C.), W. G. Massenburg (G. C. & S. F.), C. F. Green (S. P.), C. S. Thompson (D. & R. G.).

Discussion.—A. M. Van Auken (M. D. & Gulf).—There seems to be no one method that is best for all cases. Where there is rock bottom, or the soil does not wash, riprap is best. In alluvial streams, mattress revetment is best, although expensive. It must be carried from low water out to the center current, in order that the current will not work under. It must be extended above and below the danger zone to avoid cutting behind. With these provisions, the mattress will be a permanent protection. The mattress is only serviceable under water, where it is not subject to decay. Rivers are continually changing, and a plan good this year may not apply next year. Dikes must be close enough together to break up eddies or they will form below.

J. M. Staten (C. & O.).—Broken-up slate is good to stop wash. There are many slate quarries on our line where this is secured. It forms mats with the sediment and is never carried away. If the current cuts under the slate it slides down but does not wash away.

Mr. Rettinghouse.—The North Western is spending $30,000 to $50,000 annually at Blair to protect the bank. Much work has also been done at Pierre to protect the new bridge.

Mr. Loftin.—The Queen & Crescent has no stone in the South to protect washouts. We have to haul slag from Birmingham; this does good work. Burmuda grass takes hold quickly in slag and holds well.

Mr. Van Auken.—On the Mississippi river we are using cypress boards for mats where brush is scarce. Ordinarily, prices for mats are per lineal foot, but the width varies greatly, so that is no definite guide.

RECORDS OF BRIDGE BUILDING.

The committee made no report.

SUBJECTS FOR NEXT YEAR.

The committee on Subjects submitted the following:

1. Derricks and Other Appliances for Handling Material in Supply Yards.
2. Sash Size and Kind of Glass for Roundhouses and Shops.
3. Concrete Tank Construction.
4. Brick Veneer Station Buildings.
5. Roofs and Roof Coverings.
6. Reinforced Concrete Culvert Pipe.
7. Construction and Maintenance of Long Pipe Lines for Locomotive Water Supply, Intakes, Pipe Lines, Pump Pits, Reservoirs, etc.
8. Development of Turntables to Meet Operating Conditions for Modern Locomotives, Showing the Most Improved Practice.
9. Track Scales, Construction and Maintenance.
10. Painting Structural Iron or Steel for Both Bridges and Buildings.
11. Relative Merits of Brick and Concrete in Railway Buildings and Platforms.

ELECTION OF OFFICERS.

The following officers were elected for the ensuing year: President, F. E. Schall (L. V.); first vice-president, A. E. Killam (Intercolonial); second vice-president, J. N. Penwell (L. E. & W.); third vice-president, L. D. Hadwen (C. M. & St. P.); fourth vice-president, T. J. Fullem (Ill. Cent.); secretary, C. A. Lichty (C. & N. W.); treasurer, J. P. Canty (B. & M.). Executive committee: G. Aldrich (N. Y. N. H. & H.); P. Swenson (M. S. P. & S. S. M.); G. W. Rear (Sou. Pac.); W. O. Eggleston (Erie); W. F. Steffens (B. & A.); and E. B. Ashby (L. V.).

The next convention will be held at Baltimore, Md., during the third week of October, 1912.

EXHIBITS.

At the annual meeting of the Bridge and Building Supply Men's Association, held at the Planters' Hotel, October 17, the following officers were elected: President, L. E. Wolcott, U. S. Wind Engine & Pump Company, Batavia, Ill.; vice-president, H. Henning, Eastern Granite Roofing Company, New York; treasurer. J. A. Meadew, Paul Dickinson, Inc., Chicago; and secretary, D. A. Bonitz, National Roofing Co., Chicago. P. C. Jacobs, H. W. Johns-Manville Company, New York, was made a member of the executive committee.

The following firms made exhibits:

Allith-Prouty Company, Chicago.—Floor hinges, passenger station doors, and other door specialties. Represented by W. D. Jamison.

American Hoist & Derrick Company, St. Paul, Minn.—Literature and photographs describing hoisting engines, derricks, etc. Represented by F. J. Johnson.

American Valve & Meter Company, Cincinnati, Ohio.—Poage style H valve chamber, its latest improvement in stand pipes. Represented by J. T. McGarry and F. C. Anderson.

Asphalt Ready Roofing Company, New York.—Protection and Arrow brand roofing, No. 5 sand surface, No. 6 gravel surface, made with 6-in. lap, all nailing concealed. Represented by W. A. Hemenway and H. H. Hustead.

Barrett Manufacturing Company, New York.—Literature, Barrett's specification roofs, waterproofing and tar. Rok sub-floors. Represented by L. C. Sibley, W. S. Babcock, E. J. Caldwell and H. B. Nichols.

Carey, Philip, Company, Cincinnati, Ohio.—Carey's flexible cement roofing. Represented by P. Stagg, D. R. Warfield and G. W. Lincoln.

Chicago Pneumatic Tool Company, Chicago.—Railway section and inspection gasolene motor cars, Boyer hammers and Little Giant drills; also sectional views of same. Represented by C. E. Walker.

Detroit Graphite Company, Detroit, Mich.—Literature describing paints used on railway structures. Represented by T. R. Wyles, B. Ofallon Randolph, L. D. Mitchell and J. J. Hogan.

Paul Dickinson, Inc., Chicago.—Smoke jacks, chimneys and ventilators. Represented by A. Meaden, A. J. Filkins and W. H. Dayton.

Dixon Crucible Company, Jersey City, N. J.—Samples of crucibles, literature describing products, photographs of bridges and other structures on which its paint is used. Represented by H. A. Nealey.

Eastern Granite Roofing Company, New York.—Safeguard granite roofing, Evertite roofing and roof paints. Represented by H. Henning and C. F. Barstow.

Fairbanks, Morse & Company, Chicago.—Literature describing its several devices. Represented by C. W. Kelley, F. N. Roy, A. F. Young and E. E. Pendry.

Johns-Manville Company, H. W., New York.—Samples of asbestos roofing, Regal type roofing, asbestos shingles, sheet and granulated cork, Keystone insulation, asbestos Transite smoke jack, pipe covering and asbestos packings. Represented by J. C. Young, H. R. Wardell, J. H. Trent, C. E. Murphy, P. C. Jacobs and H. A. Waldron.

Lehon Company, The, Chicago.—Samples of Roofrite roofing, Tuftex water-proof burlap, bridge and subway work. Represented by Tom Lehon.

National Roofing Company, Tonawanda, N. Y.—Roofing paints and coating. Represented by P. E. Sinnett and D. A. Bonitz.

Rabok Manufacturing Company, St. Louis, Mo.—Preservative paint for metal and wood. Represented by D. C. Wray, L. S. Flattu and T. A. Wray.

Railway Age Gazette, New York.—Sample copies of the *Railway Age Gazette* and the *Signal Engineer*. Represented by John N. Reynolds and E. T. Howson.

T. W. Snow Construction Company, Chicago.—Model of Dupree tank hoop, literature and photographs of boiler washing plants, sand blast machines, water cranes, pumping plants, sand blast machines, coal handling machinery and gasolene engines. Represented by R. E. Gurley and M. Miller.

Spencer I. Otis Company, Chicago.—American scale and Economy tie plates. Represented by George Ringshausen and A. J. Odegaard.

Standard Asphalt & Rubber Company, Chicago.—Literature describing permanent waterproof asphalt flooring and asphalt mastic work. Represented by W. H. Lawrence.

Texas Company, The, Houston, Tex.—Samples of Texaco roofing and Texaco asphalt for bridge waterproofing, paint, pipe dips and coating. Represented by J. Jordan and C. C. Daniels.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Samples pine, fir and cypress staves for water tanks; also round, half round and flat wrought iron lug hoops and middles of steel structural tanks, water columns and water column valves. Represented by L. E. Wolcott and C. E. Ward.

In 1910 the Chilean government engineers completed surveys on nine short or feeder lines to the trunk system known as the Longitudinal Railway; these have a length of 252 miles. Other surveys are now under way for 248 miles. Concessions were granted during the year to construct private lines amounting to 210 miles.

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY F. M. PATTERSON,
Assistant Engineer, Chicago, Burlington & Quincy, Chicago.

On any roadmaster's division the roadmaster usually can know within reasonable limits the amount and character of the traffic that his track will be called on to sustain and the expenditure that he will be allowed to make for labor and material. Clearly, then, the problem is to get the best results with the labor and material at hand. The problem of handling men is the most important one that the roadmaster has to face, and if he can handle his superiors, who supply the material, and his subordinates, who use it, the way is open for him to secure effective results.

The matter of handling one's superior officers is a serious one, and the only way to succeed in any eminent degree lies in knowing absolutely the conditions affecting all parts of one's territory and having a systematic plan for its maintenance and improvement; also to have the courage to defend and adhere to that plan until definitely overruled, and then to endeavor faithfully to follow out the line of action laid down in its place.

It is in the management of his subordinates that the roadmaster must look for the best results. He should be an instructor to his men. While the section foreman is seldom a man of more than elementary education and usually has acquired the knowledge of his work by hard labor rather than by deductive reasoning, he also is usually an observer, and his interest can be stimulated by telling him why a thing should be done when he is given the order to do it. The plan of having meetings of section foremen for the discussion of their work and the interchange of ideas is one that has given such good results that it is to be regretted the scheme has not been more generally adopted.

If he is to maintain his track efficiently, the roadmaster must not only be secure in knowing his work, and able to plan his campaign, but must have under him a corps of foremen who will follow his orders, and at the same time have enough initiative to be able to act on their own judgment in cases of emergency. Such men are still to be found on railways today, but it must be admitted that young men with the proper qualifications to take their places are not plentiful. This is a vital problem, and the roadmaster who can evolve a successful plan for securing the necessary supply of foremen for the future will accomplish something of no mean value.

Discipline must be maintained firmly but in a way that will work no injustice; the men must be made to feel that in all cases an impartial investigation is made before judgment is passed. A spirit of loyalty should be fostered and suitable recognition given for meritorious actions lying outside the sphere of regular work. It is too much to expect that the foreman will be an expert bridgeman or car repairer, but he will often discover conditions whereby prompt action on his part may avert serious trouble.

The drudgery of track work deters many from entering the service, therefore labor-saving devices should be investigated fully, but with an open mind and no device should be approved until it has had a thorough trial and has been studied from all angles.

It is essential that the roadmaster know promptly the amount of work his men accomplish every day, and to do this he should study the reports from his foremen. In view of the many reports now required from the foreman and his limited capacity for clerical work, one hesitates to add to the burden, but often it will be found that a simple report form can be devised that will give the roadmaster the desired information better than the forms in use. In any event, the roadmaster's clerk should keep cost data up to date from the best available sources, and tabulate it in convenient form for the roadmaster's inspection, so that he may keep in constant touch with the cost of work on his different sections and apply himself to remedying conditions where they are

*From a paper entered in a contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

not satisfactory. Especial attention should be paid to the performance of work trains and every effort should be made to pick the best men for the crews. Intelligent planning and execution of the movements of the train must be made, and co-operation with the chief despatcher should be had at all times. On work involving the use of several trains for an extended period it will be found economical to have an assistant or supervisor in charge, thus relieving the roadmaster of much of the detail and allowing him to devote himself to the work on his entire division.

Waste, either of labor or of material, must be guarded against with the utmost vigilance, for by reason of it injustice is done both to the railway and to the roadmaster himself. The railway is defrauded because it has paid out money for which it received no return, and the roadmaster is injured because his division is deprived of money that otherwise could have been spent in needed improvements. While it is true that all roads do not make monthly or yearly appropriations for maintenance work, the maximum amount that can be spent for each division is usually pretty well fixed, and for every dollar wasted there must be a dollar's worth of needed work left undone.

USING SECTION MOTOR CARS TO PROMOTE EFFICIENCY.*

BY W. H. KOFMEHL,
Roadmaster, Chicago, Milwaukee & St. Paul, Elgin, Ill.

About two or three years ago several large railways began to investigate the use of motor cars for section forces. The Chicago, Milwaukee & St. Paul was very anxious to give these cars a thorough, practical test, and in order to carry out this test a plan was figured out for replacing hand cars with motor cars on the C. & C. B. division in Illinois. This division consists of 130 miles of double track, and carries a very heavy traffic out of Chicago. In rearranging sections they were lengthened from 4 to 5 and 5½ miles double track, reducing the expense of foremen one-third without losing any supervision or efficiency. In fact, so far as supervision and efficiency are concerned it is believed that the sections are better off than they were with the hand cars. About one hour per day is saved in going to and from work, while at times of derailments, washouts and fires, and for patroling track, their value cannot be over-estimated. In order to make quick storm patrols a system was worked out whereby all cars go in one direction regardless of section limits and report at the next telephone station to the train despatcher.

Some considered motor cars dangerous on account of the liability of meeting trains, but our experience has been that there is not as much danger with motor cars as with hand cars, as the cars are on the road only about half as long. It only requires a few minutes to get to work, and if the track is clear the men will get to their destination before any train comes in sight.

Both the Rockford and the Fairbanks, Morse & Co. cars are used, and the cost to operate them, including gasolene, valve oil, and repairs, averages about $4 per month per car. When one considers that some of these cars are among the first air-cooled motor section cars used, this expense is very light, and in time, with improved cars, it should be reduced at least one-half. It is figured that on this division from $8,000 to $10,000 a year is being saved by the use of these cars in addition to the salvage recovered in the way of tools, section houses, hand and push cars, etc. Seven sections were done away with, while among the equipment recovered when the change was made to motor cars were seven tool houses, seven hand cars, seven push cars, 526 tools of different kinds, including 33 shovels, 20 picks, 24 tamping bars, etc., in addition to a hand car released for every motor car supplied.

In discussing the unfavorable features of the motor car, it must be remembered that the car must be limited to not over 800 lbs. in weight, therefore the best kind of material and workmanship must be employed to put out a strong and durable car that should last four or five years before going to the shop. About the only serious objection we have found to the motor cars is that we expect too much from them. Instead of lengthening the sections from 8 to 12 or 14 miles on single track, and from 3½ to 6 miles on double track, the section should be kept to a reasonable length.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

PUBLICITY AND ENCOURAGEMENT IN TRACK WORK.*

BY J. A. M'RAE,
Refrigerator Inspector, Union Pacific, Grand Island, Neb.

Before we can discuss this problem intelligently we must know just what "efficiency" means. The author of a recent magazine article on "Scientific Management" had the laborer with the strongest back and the weakest mind obeying the foreman as a machine responds to the hand on the throttle, stopping and starting at the word of command, regulating every movement by the watch, toting pig iron from pile to car at the rate of forty-eight tons per day; he called the resulting pile "efficiency."

Such may be pig-iron "efficiency," but assuredly it is not railway "efficiency," for the dominant railway note is "safety," and the production of "safety" requires intelligence not only at the head of the organization, but in every working unit. Intelligence cannot be found in a mere machine, nor in a man willing to become an automaton. Safety, then, with greatest track improvement at lowest cost, should be considered track "efficiency."

To promote efficiency the roadmaster must be efficient himself, knowing thoroughly and being able to teach every detail of his work. He should cultivate in his men to the highest degree the qualities of loyalty, honesty, industry, alertness, carefulness and mental independence

To secure the greatest improvement with the least cost, a generous emulation must be stimulated among the foremen. For this purpose proper publicity is effective. Some personal experience will illustrate its application.

Some years ago, when the writer was assisting a roadmaster having charge of twenty-two sections embracing 180 miles of track, as the time approached for the commencement of an important division of track labor, say, tie renewals, a circular about as follows would be issued to section foremen. "The roadbed will soon be free from frost. Foremen will watch carefully for heaving and soft spots in track, taking all necessary precautions to keep track safe. As soon as the frost is out we will start renewing ties and push this work vigorously so that it may be completed before the arrival of hot weather. Foremen will have everything ready, tools put in good condition, and promptly request anything necessary to fill up standard allowance."

At the end of each month, specially good work would be commended in such a circular as: "I am much pleased with the report of J. Jones, section 7, who shows 700 ties put in this month. I shall call the superintendent's attention to this excellent showing. William Smith, section 17, had no stock killed this month. This shows careful attention to fences. Stock on track not only entails heavy money loss when killed, but is a source of danger to trains. Carefulness is always highly comendable."

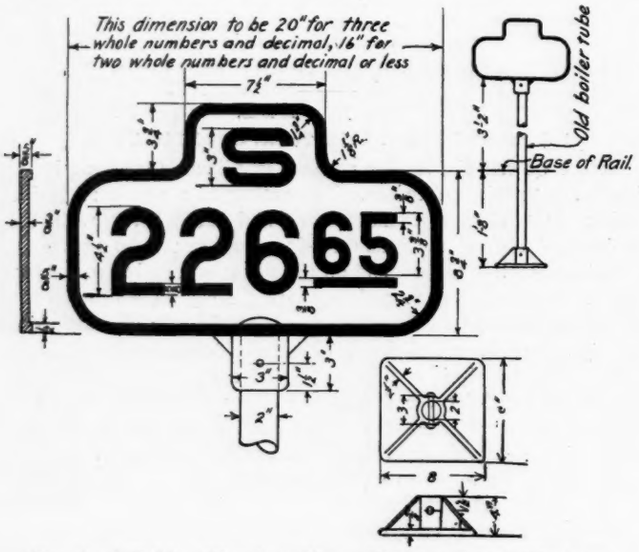
It soon became an easy matter to pass the praise around, each foreman receiving a portion two or three times yearly, and the necessity for criticism almost entirely disappeared, while that roadmaster's district held for several years the system record for low maintenance cost per mile, with never an accident due to track defects. It will be noted that every circular issued in some way emphasized "safety" as a vital consideration.

With such a system the main thing left for the roadmaster to do to promote efficiency is to watch for "track kinks" in the *Railway Age Gazette* and elsewhere, and where one is found good and available bring it to the attention of his men as he meets them at their work in his trips over the road on his motor car.

*From a paper entered in the contest on How the Roadmaster Can Promote Efficiency, whichc closed July 1, 1911.

RIGHT OF WAY SIGNS ON CHICAGO GREAT WESTERN.

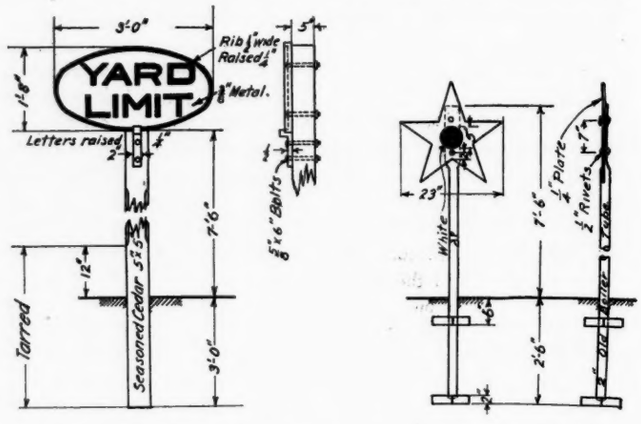
The Chicago Great Western has adopted standard designs for caution signs, bridge number signs and flanger signs, which consist of a cast iron sign supported by an old boiler tube. This type has the double advantage that it is permanent and


This dimension to be 20" for three whole numbers and decimal, 16" for two whole numbers and decimal or less
7½"
S
2265
Old boiler tube
Base of Rail.

Standard Bridge Number Sign; Chicago Great Western.

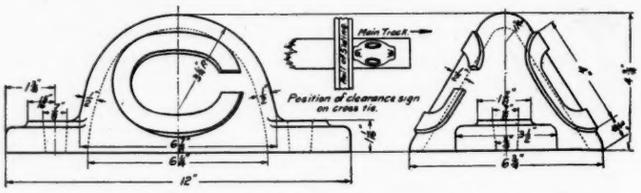
that it utilizes old boiler tubes which would otherwise be scrapped. The work of cutting the tubes, casting the signs and assembling the completed sign is done in the company shops at Oelwein, Iowa, and they are shipped out from there as required. The patterns for the cast signs, which are of wood, are made by a private company to specifications furnished by the railway company. From these wooden patterns are made numerous cast iron patterns which are used in casting the signs. In the case of the bridge number signs the letters and numbers have to be changed for each casting.

The lower ends of the boiler tubes are set in cast iron anchors 8 in. square with a socket 4 in. deep. The cost of these signs, not including the original cost of pattern, nor the cost of shipping and erecting, is approximately as follows: Caution sign, $2.50 each; bridge number sign, $2 each; flanger sign, $2.25 each. The company's standard clearance sign, as shown, is a solid casting painted white with black letters. As in the case of the cast iron signs mentioned above, these castings are made in the company shops and shipped out over the system. The approximate cost of these signs is $2 each.

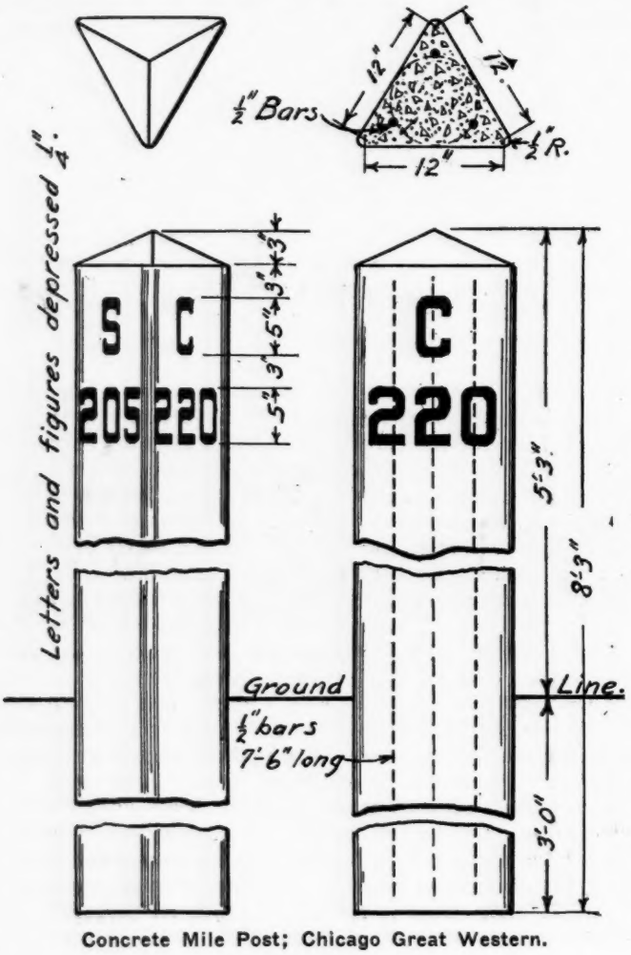


Standard Yard Limit and Flanger Signs; Chicago Great Western.

The concrete mile-posts which are now being placed on this road are shown herewith. The concrete is one part cement, two of sand and four of broken stone or gravel. Letters and figures are sunk ¼ in. and painted black. The reinforcement consists of three ½-in. bars. These posts are purchased from the maker, as the company has not thought it expedient to go into the manufacture of this class of posts.



Standard Clearance Sign; Chicago Great Western.



Concrete Mile Post; Chicago Great Western.

PRAISING AND REWARDING THE FOREMAN.*

BY S. B. PETER,
Roadmaster, St. Louis & San Francisco, Pittsburg, Kan.

Use care in the selection of foremen, and, having placed a man in charge of a section, do not be too ready to find fault with his work. Take advantage of every opportunity to come in closer touch with the work, offering suggestions as to methods rather than issuing peremptory orders as to how the work should be done. When a foreman is doing good work, a word of commendation does not increase the payroll, but does increase the incentive to try to excel in amount and quality of work accomplished. After a reasonable length of time, if a man wants leave of absence with transportation to some point ask for it

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

for him, and show him that faithful service is rewarded. If these methods fail to accomplish the desired result, and a foreman seems to think that the company owes him a living, the sooner he is dismissed from the service the better for all concerned.

REVETMENT WORK ON THE MISSOURI PACIFIC.

The Missouri Pacific recently completed bank protection work at several points along the Missouri river between Kansas City, Kan., and Leavenworth, on which a somewhat different method was employed than is commonly used on this river. What is termed a loose fascine mattress was built, which is somewhat in contrast with the basket woven type of mattress generally used on the Missouri by the United States government engineers. This lose woven type is a modification of the tight fascine mattress which is used by the government engineers on the lower Mississippi river work. It requires less material and labor than the tight fascine mattress and the conditions on the Missouri river do not absolutely require the latter type.

In building this loose fascine mattress, no specially constructed barges are required. This is a distinct advantage, as mattress protection work is not going on at all times, and it very often happens that every available barge is in use for rip rap paving

Weaving Barges, Showing Bottom Poles and Loose Fascine Just Completed.

construction at the time it is desired to do revetment work. To provide special mattress barges would mean an idle plant to maintain often for long periods.

In constructing the loose fascine mattress, poles termed "bottom poles" are placed about 8 ft. apart on the barges and are allowed to remain under the mattress and form a part of it. On top of these poles and along one end of the barges the mattress head, 18 to 24 in. in diameter and of a length equal to the width of the proposed mattress, is built up with other poles. The whole is carefully bound together with wire strands to which are fastened the cables that are to act as head lines during the sinking of the mattress, as well as the wire strands that will act as the sewing cables for binding the loose fascines together. These sewing cables are usually composed of ordinary commercial galvanized wire strands from ¼ to ⅜ in. in diameter, and one pair is placed at each bottom pole.

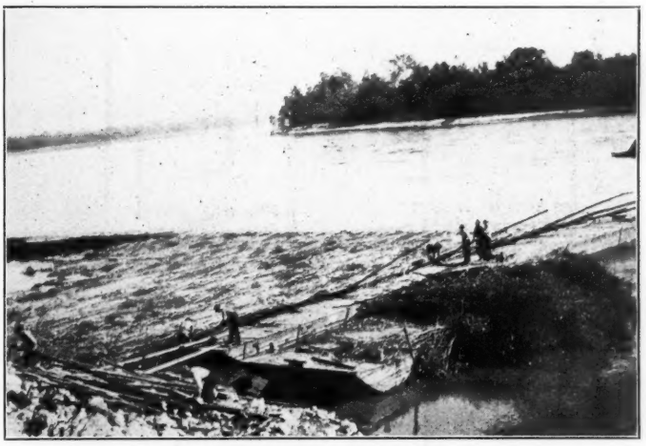
With one sewing cable of each pair lying on the barge and the other one thrown back up stream and over the mattress head, a layer or bed of brush about 1 ft. thick and 4 ft. wide is placed along and next to the mattress head, and on top of the bottom poles and the one sewing cable. This bottom sewing cable is then brought up over the bed of brush and drawn back reasonably tight either by hand or with block and tackle, depending on whether or not the mattress is to be comparatively tight. The cable is then temporarily fastened down by means of a staple driven into the mattress head or into the preceding fascine. The other sewing cable is then brought forward, thrown across the barge, and acts as the bottom cable for the following bed of brush. This process is repeated until the mattress is of the desired length. The bottom poles are made continuous by splicing others to them as needed, while the sewing cables are looped around them at short intervals. Transverse cables securely fas-

Loose Fascine Mattress, Showing Two Lines of Sewing Cables.

tened to the bottom poles and to the sewing cables are placed at intervals and lead up the bank to dead-men or anchors.

On comparatively steep banks, top poles called "binders" are placed on top of the loose fascines and directly above the bottom poles, being securely fastened thereto as well as to the sewing cables. These are placed on the mattress after the latter is lying flat on the river, and their purpose is to prevent the rip rap ballast from rolling off the mattress after it reaches the bottom.

The "basket woven" type of mattress can best be understood by observing the photographs. No poles are used underneath, although if deemed necessary some can be placed on top to pre-



Loose Fascine Mattress, in Foreground, with Weaving Barges and Partly Loaded Brush Barge.

vent the rip rap from rolling off, as with the other style of mattress. Galvanized wire strand is threaded through the mattress at regular intervals and in both directions. The brush work is from 12 in. to 18 in. thick. Only selected brush (bar growth willow ½ in. to 2 in. in diameter at the butt end and 10 to 25 ft. long) can be used for this class of work, and expert labor is required to weave it together. By more carefully observing the views, it will be noted that the brush is stranght and of comparatively uniform size.

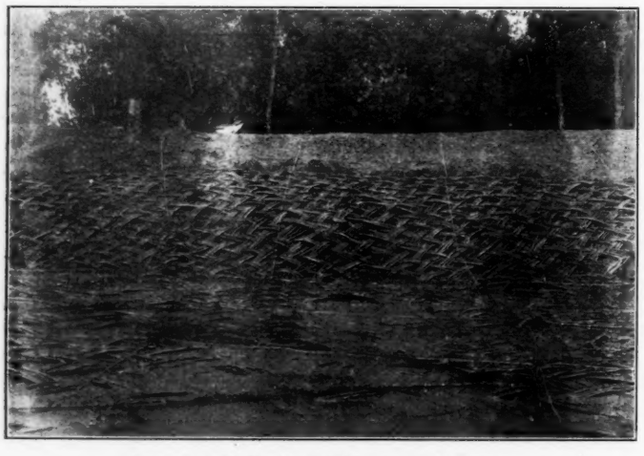
When publishing the cost of river protection work, the figures usually show the expense per linear foot of bank protected, which includes the top bank rip rap paving; however, from a few figures at hand it is found that the basket woven type of mattress costs from 6 cents to 8 cents per sq. ft. in place; while the loose fascine type costs from 4 cents to 6 cents per sq. ft. Under favorable conditions, on one recent job this cost went down to 3.6 cents per sq. ft.

The difference in cost may be ascribed to the following: (a)

Near View of Basket Woven Mattress.

No special weaving barges are required for the fascine type. (b) The fascine mattress can be constructed more rapidly with common labor than the basket mattress can be with experienced weavers who command much better pay. (c) Any kind of brush near at hand can be used to build the fascines, while the bar growth willows for the basket mattress are becoming more scarce every year, and at times must be brought from quite a distance.

In favor of the basket woven mattress, the following claims are usually brought forward: (a) It provides a tighter covering for the bank protected. In answer to this it may be said that a tight fascine mattress can be obtained at small additional expense by the use of block and tackle to tighten up each bundle of



Completed Basket Woven Mattress.

brush. Also, the writer's [Mr. Miller's] experience on the Missouri river during the past six years seems to indicate that the loose fascine mattress is sufficient for the purpose used. (b) That the brush is so woven and interlocked together that after it once gets in place at the bottom of the river it will hold together even after the wire fastenings have rusted out. This is a very good point, but very much the same result can be obtained through the use of the "brush and weaving pole" type, which is still the United States engineers' standard on the Arkansas river. It brings about to a large extent the interlocking, while at the same time permitting the use of comparatively rough brush. However, from some carefully conducted experiments made years ago by the writer, it is unquestionably a fact that the galvanized wire strand and other iron fastenings are of longer life than the brush itself, particularly so in cases where the action of the river brings about scour along the outer edge of the mattress after it has been in place for several years, thus bringing a bending strain upon the brush. The experiments referred to developed the fact that willow brush, that had been in the river for from seven to ten years has assumed a condition of wet rot, such as to render it practically devoid of strength to resist bending; due in large measure no doubt to the fact that it was almost wholly sap wood. It may be mentioned here that the fascine type of mattress permits the use of hard wood brush.

We are indebted to C. H. Miller, engineer of river protection of the Missouri Pacific, for the information given above.

FORCE ACCOUNT SYSTEM FOR CONSTRUCTION WORK.

BY WILLIAM S. WOOLLNER.

Friction between engineers and contractors, caused by controversies as to what constitutes force account work, or work paid for at cost plus a percentage, and the adjustment of force account bills, occurs on almost every large piece of construction work,

Cy. 4595. Reg. 1401 E. 538-6-15-10 FORM 628

ORDER FOR FORCE ACCOUNT WORK No. 89

Covelo, February 25rd 19 11.

John Jones & Company, Contractors:

You will please perform the following work at Survey Station 1487+92 to 1490+23, charging same to NORTHWESTERN PACIFIC RAILROAD COMPANY, as per terms of contract:—

Grub all stumps from above cut.

Signed A. C. Brown
Assistant Engineer.

BILL FOR FORCE ACCOUNT WORK performed on the above order.

NORTHWESTERN PACIFIC RAILROAD COMPANY

To John Jones & Company, Contractors.

DATE	No.	OCCUPATION	RATE	AMOUNT	DATE	No.	OCCUPATION	RATE	AMOUNT
Feby.					Feby.				
24	1	foreman	3.50	3 50	26	1000#	40% Giant	12¢	120 00
	11	laborers	2.00	22 00		98	5X Caps	1¢	98
25	1	foreman	3.50	3 50		140	T. T. Fuse	1-2¢	70
	18	laborers	2.00	36 00					
26	1	foreman	3.50	3 50					121 68
	1	powderman	2.75	2 75			+ 1/4¢ lb.		2 50
	12	laborers	2.00	24 00					
	1	2H teamster	2.50	2 50					124 18
	2	horses	1.00	2 00					
	1	wagon	.20	20					
27	1	foreman	3.50	3 50					
	10	laborers	2.00	20 00					
28	1	foreman	3.50	3 50					
	11	laborers	2.00	22 00					
				148 95					
		+ 10%		14 90					
							BROUGHT FORWARD.		165 85
		CARRIED FORWARD.		165 85			TOTAL		288 03

Assistant Engineers will give an order on this form (in duplicate) for all work to be done on force account. Contractors will retain original, and render bill on duplicate. NO OTHER BILL WILL BE ACCEPTED.

Correct

A. C. Brown
Assistant Engineer.

Form 628—Order to Contractor for Work and for Making Up His Bill.

and as lack of harmony between road and contractors tends to add to the cost, as well as to detract from the efficiency of the work, anything that will tend to eliminate such differences will be well paid for by the results obtained. Questions arise as to whether certain work should be paid for as force account work, and there also often is controversy between engineers and contractors about the amount of labor and materials used on force account work, the reports of the timekeepers differing.

To avoid all controversy in regard to force account work, first, it should be decided in advance what work is to be done on a force account basis; and, second, reports of the engineer and contractor covering men and material used on force account work should agree. The following system for handling force account work has been devised with these principles in view, and experience has shown that if it is strictly followed, most of the friction between the contracting parties will be eliminated.

Form 628 is used for giving an order on the contractor to perform force account work and for making up his bill for work performed. Form 622 is used as a daily report of labor, equipment and material used on force account work. The rates of pay for labor, rental rates for stock and equipment, prices of material, and percentage to be paid in addition to cost should, of course, be stated in the contract, as should the class of work to be done on force account basis as nearly as it can be stated at the time the contract is drawn.

When an engineer wishes to have a certain piece of work done on a force account basis he issues an order in duplicate, on form 628, giving a description of the job, as well as its location and hands the same to the contractor's representative. It is understood between the contracting parties that no force account work is to be undertaken without a written order from the engineer, and that no bill for force account will be given consideration unless it is accompanied by the engineer's order. All engineers are provided with duplicating pocket books (No. 0—McDonald Stylograph) and if they find it necessary to issue orders for force account work while away from their headquarters, they do so by handing the contractor's representative a memorandum order, a carbon copy of which remains in the pocket book. Upon returning to headquarters the engineer immediately issues an order on regular form (628) to replace the memorandum order. The orders are numbered consecutively as issued.

The engineer's timekeepers keep a record of the labor, equipment and material used on force account work, compiling the same from data collected by themselves. Each evening they record this data on form 622, showing the number of force account order on same. This report is made in triplicate, one copy being retained by the engineer, one copy handed to the contractor, and one copy forwarded to the chief engineer or other officer in charge of final approval of bills. When daily reports have been completely filled in they are handed to the contractor's timekeeper to be checked, and if he finds that they agree with his records he signs them in the space provided, retaining one copy for his record for making a bill at the end of the month, and returning the other two copies to the engineer's timekeeper, who retains one copy for his record for checking the bill at the end of the month and forwards the remaining copy to the chief engineer or other official.

After daily reports (form 622) have been signed by both timekeepers they are final and the contractor will be paid only for the items shown on these reports. The reason for making daily reports covering this class of work, instead of weekly, as is the general custom, is that when reports are checked daily there can be but little chance for dispute as to the number of men or the quantity of material used, but after reports have been left to accumulate until the end of the week before being compared, differences are likely to develop that are hard to adjust, owing to the length of time that has elapsed.

At the end of each month the contractor makes out a bill in the space provided on form 628, using for this purpose his copy of the daily reports. He then presents it to the engineer for his approval. The engineer checks the bill against the copy of the daily reports in his possession and if he finds that they agree, approves it and forwards it to the chief engineer's office for payment. As contractors must pay their men each month, they are entitled to a settlement of their force account bills at the end of the month. If a force account job runs from one month to another, the engineer should furnish the contractor with a new order on the first day of each month.

(Or. 717 Req. 2122E 2-23-11 40M) FORM 622

NORTHWESTERN PACIFIC RAILROAD COMPANY—ENGINEERING DEPARTMENT

Force Order No. 89

Daily Report of Men, Stock and Equipment employed on Construction Willits North, Grubbing Right of Way

at Sta. 1487+92 to 1490+23 *by* John Jones & Company, Contractor / Frank Smith, Sub-Contractor Covelo, February 26th, *191*1.

MEN					STOCK AND EQUIPMENT				MATERIAL			
No.	Occupation	Rate	Amount		No.	Description	Rate	Amount	Quantity	Description	Rate	Amount
1	foreman	3.50	3	50	2	horses	1.00	2 00	1,000 #	40 % Giant	12¢	120 00
1	powderman	2.75	2	75	1	wagon	.20	20	98	5X Caps	1¢	98
12	laborers	2.00	24	00					140 ft.	T. T. Fuse	1-2¢	70
1	two horse teamster	2.50	2	50								

Total Number of Men 15

Cost of Labor	$ 32.75
Cost of Stock and Equipment	$ 2.20
Cost of Material	$ 121.68
Total Cost of Job for day	$ 156.63

Percentage to be added.

Give below any information of interest to Chief Engineer's Office affecting cost or progress of above job;

Grubbing on above section about 40 % completed.

I hereby certify that the above account is correct,

Fred Mann for Contractor; A. C. Brown for Railroad.

Daily Report of Labor, Equipment and Material Used.

A simple method of checking force account bills in the chief engineer's office, to ascertain that engineers in the field are properly comparing them with daily reports, is to keep a recapitulation sheet for each order on file with the daily reports. It is an easy matter to check the total of this sheet against the contractor's bill and if the totals do not agree the error can be readily located. If totals agree, the bill is attached to the voucher for payment and as it contains the order to perform the work signed by the engineer, as well as a detailed statement of the work performed approved by him, it represents a complete record of the entire transaction. The recapitulation sheets are attached to the daily reports and filed in envelopes for ready reference.

The privately owned railways in Chile had, on January 1, 1911, a length of 1,913 miles. At the same time the government-owned railways amounted to 1,660 miles. The total of railways in operation at the end of 1910 were therefore 3,573 miles. On the government railways the additions during 1910 were 157 miles.

General News Section.

The Missouri Pacific has adopted for night tail-end signals on all its trains a lamp having Fresnel lenses.

The floods of ten days ago in southwestern Colorado did great damage to railways, roads and bridges. The Denver & Rio Grande suffered to the extent of many thousands of dollars.

The Baltimore & Ohio, after negotiations covering several days, has revised the regulations of the telegraph department allowing increased vacations with pay, and granting other things asked for by the telegraphers; but the increase of pay asked for was not granted.

Mrs. Dorothy R. Batt of Tarrytown, N. Y., has sued the Pennsylvania Railroad for $100,000 damages, because of the death of her husband in June, 1910, which she charges was due to something poisonous which Mr. Batt had eaten in a dining car of the Pennsylvania the day before he died.

At Whitman, Minn., last Tuesday, Hugh Robinson, flying in a Curtiss aeroplane, announced that he had traversed the distance from Minneapolis to that town, 110 miles, in 89 minutes, without a stop; and he carried a passenger. He has started to fly from Minneapolis to the gulf of Mexico.

The Atchison, Topeka & Santa Fe announces that the new trains to be put in service between Los Angeles and San Francisco, about December 1, will be called the "Saint" and the "Angel," respectively. The cars will be cooled by air from a refrigerating compartment. It is understood that an extra fare will be charged.

On the Southern Pacific enginemen, conductors and station agents who have been on the road for 10 years are to have free annual passes over the district to which they belong; for 15 years' service, annual transportation for employee and wife; for 20 years, a pass for the employee, his wife and dependent members of his family.

Professor Emory R. Johnson, professor of transportation and commerce, at the University of Pennsylvania, has been appointed by President Taft a special commissioner on the industrial and commercial value of the Panama canal. He will investigate present and prospective available canal traffic and the question of what rates the traffic can bear.

The stockholders of the Louisville & Nashville at their recent annual meeting, authorized an amendment to the bylaws so as to permit the company to do a commercial telegraph and telephone business; and the company has notified the Western Union of a desire to terminate the contract made in 1884, by which the Western Union does telegraph business over the L. & N. lines.

Figures compiled by H. G. Askew from records filed with the Texas Railway Commission for the fiscal year ending June 30, 1911, show that after meeting the interest of outstanding bonds and other legal charges the thirty-two principal railways of that state had a surplus of only $544,297. The same roads spent during the year $9,181,193 for additions and betterments, which when paid resulted in a net deficit of $8,636,897.

The Pennsylvania Railroad reports that the Chicago-New York 18-hour train for five months has reached its destination behind time not over twice in each month; and the westbound train, running at the same speed, was not late more than once in each month for nine months. For a continuous period of three months it was on time every day. In nearly all of the cases where these trains were late the detention was not over 15 minutes.

Beginning December 1, trains of the New York, Susquehanna & Western will run to and from the terminal station of the Erie at Jersey City instead of the Pennsylvania station, as in the past. The Susquehanna is controlled by the Erie, but until recently the Erie station lacked facilities for the admission of the Susquehanna trains, and the contract for the use of the Pennsylvania station was therefore continued. The Erie is about 2/3 mile north of the Pennsylvania.

Governors Harmon of Ohio, Hadley of Missouri and Aldrich of Nebraska met at St. Louis, Mo., on October 2 to outline the brief which they are to prepare and file in the United States Supreme Court for use in cases before the court where the power of the states to regulate rates on intrastate business is involved. Speaking of the issue raised by the governors at the recent conference at Spring Lake, N. J., Governor Hadley said that they are not attempting to interfere with the fixing of interstate rates; that "what we propose is simply to uphold the sovereignty of the states and the rights reserved by them when the federal constitution was drafted. We contend that the states have full power to regulate the rates of railways on all business which originates and ends wholly within a state."

The sixth annual convention of the Lakes-to-the-Gulf Deep Waterway Association was held at the Auditorium Hotel, Chicago, October 12, 13 and 14. Addresses were made by Governor Herbert S. Hadley of Missouri; Governor O. A. Eberhart of Minnesota; Joseph W. Folk, former governor of Missouri; O. P. Austin, chief of the bureau of statistics of the Department of Commerce and Labor; Mrs. Frederick K. Bowes, representing the Women's National Rivers and Harbors Congress, and Senator Duncan U. Fletcher of Florida. Hon. Champ Clark of Missouri, who was to have made an address, sent a letter which was read before the convention. The resolutions adopted followed closely the text of those adopted at St. Louis last year. Little Rock, Ark., was chosen as the place for the next meeting.

At a meeting of representatives of various commercial organizations and business houses, held at the LaSalle Hotel, Chicago, on October 16, an executive committee of 17 members was appointed to bring before the Interstate Commerce Commission the matter of the excess baggage rates which the roads propose to put into effect July 1, 1912, and July 1, 1914. It is planned to ask the commission to establish reasonable rates and regulations for handling excess baggage. This action amounts to a refusal on the part of the interested shippers to accept the compromise of the roads by which they postponed until July 1, 1914, the time when the rule imposing the 40-inch limit should go into effect and made a rule imposing a 45-inch limit to become effective July 1, 1912, instead of putting the 40-inch limit rule in force on July 1, 1912, as planned under the uniform baggage rules which were formulated by the roads last spring and have been in effect since May 1.

The commission appointed by the President to report to Congress on employers' liability and workmen's compensation matters, met at the Congress Hotel, Chicago, on October 16 and 17, the meeting being open to all persons interested who wished to offer suggestions or express their views as to improved methods or necessary legislation. At the session on the first day representatives of the railway brotherhoods told of the perilous lives led by railway trainmen and said the present liability law, which applies to territories and the District of Columbia, is too narrow in its scope. William G. Lee, president of the Brotherhood of Railway Trainmen, said that if the safety rules which a man is required to sign when he enters train service were followed to the letter there would be no accidents, but that the trainmen must do many things very quickly and without hesitation. He said compensation legislation should include free hospital service and the assurance to the employee that he will be taken care of physically and financially in case of accident, and that his family will be provided for in the event of his death.

Press despatches from Los Angeles October 16 say that at two o'clock on the morning of that day, about three hours before the arrival of a special train bearing President Taft and his party, 36 sticks of dynamite were found under a viaduct on the Southern Pacific at a point 20 miles north of Santa Barbara. A track watchman had a pistol battle with two men, who, however, were some distance away and escaped him. It is believed that the dynamite was placed to destroy the bridge and that the probable killing of the President of the United States may not have entered into the calculations of the plotters. Some think that the idea of the would-be dynamiters was to destroy the bridge in order to delay the passage of the President and throw discredit on the widely

printed assertion of the Southern Pacific that it was running its trains on schedule time, despite the strike of the shopmen. General Manager Calvin of the Southern Pacific has offered a reward of $5,000 for information which will lead to the arrest of the dynamiters.

The Florida East Coast Railway is to establish a telephone circuit throughout the length of its line. The Chicago, Rock Island & Pacific is installing telephone train despatching circuits on its West Kansas division, running from Caldwell, Kan., to Belleville, 277 miles, and on the West Iowa division, running from Des Moines, Ia., to Council Bluffs, 142 miles. The instruments are expected to be in operation the first of November. The Baltimore & Ohio has ordered from the Western Electric Company selector calling apparatus for five new telephone circuits; Rockwood, Pa., to Johnstown, 45 miles, two circuits; Newark, Ohio, to Cambridge, 52 miles, two circuits; Newark to Bernwood Junction, 105 miles. The despatcher at Newark manages 104 miles of line, from Newark to the Ohio river. One of the telephone circuits connects his office with the stations on the first 52 miles, and the other with the stations on the second 52 miles. One message circuit will have an inter-calling system; an arrangement by which an operator at a way-station can actuate the selector apparatus at the despatcher's office so as to call another way station without the intervention of he despatcher. The Cincinanti, Hamilton & Dayton has ordered from the Western Electric Company telephone and selectors for three new despatching circuits; Hamilton to Indianapolis, 99 miles; Cincinnati to Dayton, 60 miles, and Dayton to Toledo, 140 miles.

The four Italians arrested at Middletown, Conn., charged with murder in wrecking a passenger train on the New York, New Haven & Hartford, August 27, were discharged by the city court on October 11, Judge Pearne holding that there was no probable cause on which to hold the men for trial by the superior court. Judge Pearne found that the rail had been loosened by the withdrawal of spikes and bolts, as shown in the testimony of the railway officers and not contradicted by the defense; but to sustain the charge of murder it would be necessary, under the law of Connecticut, to have the evidence of two witnesses, or that which is equivalent hereto, and this the prosecution did not produce. The principal evidence was that of a detective who related what he had heard one of the accused say in the Italian language (and when shomewhat intoxicated), and there were inconsistencies in this narrative. The judge observed that the men might be re-arrested if new evidence should be found. In accepting the testimony that the rail had been maliciously removed, the judge went into the evidence in great detail, finding that the bolts and spikes were discovered lying on the ground with the threads of the bolts unharmed and bright; the spikes not bent or twisted; the spike holes smooth and square, not broken or splintered; splice bars not distorted, etc. The loosened rail was on the inside of the curve. None of this evidence was contradicted by the defense. The judge in his opening observed that the people of the state have a vital interest in cases of train wrecking, or suspected train wrecking, a feature of the case which has been largely neglected by the local press in its unusual interest in the disputes of the police officers and the detectives. After the release of the men, one of them sued the railway detective for $10,000 damages for slander, the charge being that when the Italians were arrested the detective accused this one of having committed murder by train wrecking in Pennsylvania. A representative of the railway company gave bail for the arrested detective.

Land Show in New York.

The first land show of the American Land & Irrigation Exposition is to be held at Madison Square Garden, New York, November 3-12. The show is to be under the management of the American Land & Irrigation Exposition Company, Inc., of which Arthur E. Stilwell, president of the Kansas City, Mexico & Orient, is president. On the advisory and governing board are W. C. Brown, of the New York Central; James McCrea, of the Pennsylvania; Darius Miller, of the Chicago, Burlington & Quincy; J. C. Stubbs, of the Union Pacific; the governors of a great number of the western and southern states, and many presidents of agricultural colleges. Exhibits have been secured from all parts of the United States, and the Department of Agriculture is co-operating with the managers of the exposition. There will be displays by railways and by various boards of trade and chambers of commerce. There is a long list of prizes valued at over $12,000. On each day of the exposition tracts of land, valued at from $1,000 to $2,000, will be given away to exposition visitors by some form of allotment.

Connected with the exposition hall is a lecture hall seating about 1,100, in which illustrated lectures are to be given each day throughout the exposition.

Space may be secured by railway companies desiring to make an exhibition by application to the American Land & Irrigation Exposition, Singer building, New York. Farm machinery, implements, etc., will be shown in the subway of the Madison Square Garden.

Connecticut Rest Law.

The legislature of Connecticut, at its session recently adjourned, passed a law which provides that except in cases of emergency an employee engaged in any commercial occupation or in the work of any industrial process shall be relieved of his occupation for one whole working day in every seven. The bill was introduced for and strongly backed by the labor organizations of the state.

Strike Notes.

Stating that they were in danger when working with the inexperienced men employed by the Illinois Central to take the places of the striking shop men on that road, members of the International Association of Car Workers at different shops along the line left their work on October 12. This action was taken in spite of orders of their general officers that they should not take part in the strike. Of about 800 members of the car workers' union on the Illinois Central about 300 were employed at the Burnside shops.

Officers of the road express satisfaction with the general situation. They say that acts of violence are becoming less frequent and that the movement of freight is but little less than normal. A temporary injunction was granted on application of the road by Judge Humphrey of the federal court at Springfield, Ill., on October 11, restraining strikers from picketing and barring them from the property of the railway in the state.

Representatives of the strikers say that few men are returning to work and that more are leaving their places. A committee representing them has demanded that the government authorities investigate the condition of rolling stock on the Illinois Central. They state that they have got into the service of the road as strike breakers skilled mechanics who report that inspection of safety devices and air brake equipment is being done by incompetent men.

An officer of the Harriman Lines is quoted as saying that he believed the strike on those lines and the Illinois Central would continue for a year. He said that while the men who strike on one road enter the service of another or secure other employment, the leaders will contend that the controversy is still in progress, and that officially the strike will probably last at least a year.

Mails by Freight Trains.

The post office department reports that the transportation of second-class mails by freight trains, in the central states, which was begun on September 1, has proved a great success and it is calculated that the government will be able to materially reduce the cost of carrying this class of mail matter. The estimates of the savings that will be accomplished are given, however, in rather vague figures. People in Nebraska who read magazines published in New York are said to find the delay due to freight transportation of not enough importance to notice, or in some cases perhaps not noticeable at all.

One publisher, however, the Review of Reviews Company, has begun suit in the federal court in New York against the postmaster-general, complaining that the freight-car arrangement is unduly prejudicial to the interests of the *Review of Reviews* and unduly preferential to other publications. The order directing postmasters to send mail matter by freight trains applies only to periodicals published fortnightly or less frequently. The *Review of Reviews*, being a monthly

publication, comes within the terms of the order; but the *Outlook* and the *Literary Digest*, two of the monthly's chief competitors, are both weekly, and so continue to go by fast trains and not by freight. The peculiarity of the situation lies in the fact that the issue of the *Outlook* for the last week in each month is larger than the issues of the other weeks, and is looked upon by the complainant as equivalent to a monthly publication. This fourth number is sold at 15 cents a copy, whereas the papers issued at other times are sold at 5 cents a copy. It is said also that 79 monthly publications have been exempted from the rule requiring such papers to go by freight; this apparently because these exempted papers are not shipped in very large quantities. A representative of the *Review of Reviews* is quoted in the newspapers as saying that he does not object to freight-car transportation in principle, but that in his case injustice has actually been done; and he says that many of his subscribers in the West have complained of very long delays.

Government, Transportation and Politics.

A faint suggestion of the kind of trouble with which both politics and business would be filled if the railway system of this country were to go into the possession of the government is furnished by the suit of the *Review of Reviews* against the postmaster-general of the United States and the postmaster of New York, asking for an injunction restraining them from enforcing the new postal regulation under which that magazine is to be carried by fast freight instead of on regular mail trains. The arrangements of the post office are of infantile simplicity in comparison with those of the railways, and the fact that the postal regulations have not, for the most part, brought about any serious complications between business and government is due entirely to the cast-iron uniformity of the few simple rules which govern the department's action. The moment a discrimination has to be made that is not absolutely mechanical, trouble begins. The part played by railway transportation in America, in the determination of prosperity or failure, not only for particular enterprises, but for whole communities, is something to which European conditions afford nothing like a parallel. With us government ownership would mean a tremendous plunge of politics into the deep waters of business, a plunge of which the experience of the compact European nations cannot give the faintest idea.—*Evening Post* (New York).

U. S. Steel Will Possibly Cancel Great Northern Ore Lease.

It is understood that the United States Steel Corporation will cancel its lease of the Great Northern Iron Ore Properties. The provisions of the lease are that the Steel Corporation may surrender the same in 1915 by giving two years' written notice. Unless so terminated, the lease continues in effect until all the merchantable ore containing 49 per cent. of iron has been shipped, and as long thereafter as the minimum royalty is paid. The lease reads to the Great Western Mining Company, a subsidiary of the United States Steel, and is guaranteed by the Steel Corporation. The lease covers 39,296 acres. A royalty is paid by the Great Western Mining Company on a basis of $1.65 for each ton of ore containing 59 per cent. of iron delivered at the dock in 1907. The royalty increases 3.4 cents per ton annually during the life of the lease. The minimum tonnage to be mined in 1907 was 750,000 tons, with an increase of 750,000 tons annually until the maximum of 8,250,000 tons is reached in 1917. No ore to speak of was mined in 1907-8-9, but royalties were paid on the minimum amount that the lease provided for in those years. The properties are held in trust by James N. Hill, Louis W. Hill, Walter J. Hill and E. T. Nichols, and 1,500,000 shares of permanent certificates for beneficial interests in the trust were issued in 1907 to Great Northern Railway stockholders.

Disastrous Collision at Gilmore Junction, Neb.

In a butting collision between an eastbound freight and westbound passenger train No. 105 on the Missouri Pacific at Gilmore Junction, Neb., eight miles from Omaha, on October 15, six passengers and one trainman were killed and 10 or more persons were injured. The collision occurred near Fort Crook and officers and soldiers, including medical men, went quickly to the rescue of the injured persons. Officers and surgeons of the Union Pacific Railroad and of the Omaha Street Railway also assisted. The injured persons were taken to Fort Crook for treatment. The freight train had encroached on the time of the passenger, the conductor and engineman both having left South Omaha without examining the train register and having for some unaccountable reason forgotten about passenger train No. 105; and this, notwithstanding they had a short time before received a message from the despatcher calling attention to that train. This conductor had been in the service of the Missouri Pacific 21 years and the engineman 7 years.

Railway Electrical Engineers.

The fourth annual convention of the Association of Railway Electrical Engineers will be held in Chicago at the La Salle hotel, November 6-10, inclusive. The programme includes committee reports and papers on Car Ventilation, Shop Practice, The Gas-Electric Car, Train Lighting Practice, and Industrial Trucks for Railway Service. J. Andreucetti, Chicago, is secretary.

M. M. & M. C. B. Conventions.

A joint meeting of the executive committees of the Master Mechanics' Association and the Master Car Builders' Association will be held at the Belmont Hotel, New York, on October 24, to decide on the time and place for holding the 1912 conventions. A meeting of the executive committee of the Railway Supply Manufacturers' Association will be held at the same time.

The Cleveland Engineering Society.

At the meeting of the Cleveland (Ohio) Engineering Society, held October 10, there was a talk on Profitable Sharing vs. Profit Sharing, by E. P. Roberts. A special meeting of the society will be held October 24, at which Charles S. Gingrich of the Cincinnati Milling Company, Cincinnati, Ohio, will deliver an illustrated lecture on Modern Machine Shop Milling Processes.

Western Society of Engineers.

At the extra and joint electrical meeting of the Western Society of Engineers, to be held October 25, there will be an address on Reactance in Alternating Current Circuits, by Dr. C. P. Steinmetz.

Brooklyn Engineers' Club.

At the meeting of the Brooklyn Engineers' Club, held on October 19, a paper was presented by W. G. Kaylor, of the Westinghouse Air Brake Company, New York, on the Air Brake as Related to Progress in Locomotion.

Car Foremen's Association of Chicago.

At the meeting of the Car Foremen's Association of Chicago on October 9, the following officers were elected: President, George Thomson (L. S. & M. S.); first vice-president, F. C. Schultz (C. B. & Q.), and second vice-president, C. H. Olson (C. & N. W.).

New York Railroad Club.

At the regular meeting of the New York Railroad Club, on October 20, A. R. Roy will present a paper on Swedish Steel.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; Sept. 10, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The annual meeting of the National Industrial Traffic League will be held at the La Salle Hotel, Chicago, on November 16.

A shipment of 900 bales of cotton has been made from western Florida to New Orleans, said to be the first important movement of cotton in that direction for many years.

At the October meeting of the St. Louis Association of General Passenger Agents all but two of the lines entering the union station at that place voted to continue the joint validating agency, this with a view to prevent ticket scalping.

The legislature of Panama, which has recently adjourned, passed a bill to provide for the construction of the Panama & David railway, which has been under consideration throughout the session, but some of the provisions of the bill were so objectionable to the president of the republic that he vetoed it.

The freight movement on the Missouri Pacific-Iron Mountain for October 6 was the largest in the history of these lines, 13,309 loaded cars. The following day, Saturday, was almost as great, 13,049 loaded cars. On Monday, October 9, 3,415 cars were loaded on the Missouri Pacific-Iron Mountain tracks.

Mileage tickets of the Boston & Albany are now good over the New York, New Haven & Hartford and the Central New England. The Boston & Albany now has an arrangement of this kind with the New Haven, the New York Central, the Rutland, the Reading, the Central of New Jersey, the B. R. & P., and the Buffalo & Susquehanna.

Exporters of grain at New York City express marked satisfaction in the action of the railways last spring in reducing from 5.5 cents a bushel to 4 cents, the freight rate on grain from Lake Erie to New York habor. Receipts of wheat at New York this year for five months, May-September, have aggregated over 10,000,000 bushels, as compared with less than 2,000,000 last year.

From November 15 next the Sunset Railroad (California) will be operated by the Atchison, Topeka & Santa Fe. This road extends from Gosford, near Bakersfield, to Sunset, Shale and Monarch, in the oil district. The road is jointly owned by the Santa Fe and Southern Pacific, the terms of agreement being that each shall operate alternately for five year periods. The Southern Pacific has operated it during the past five years.

Announcement has been made that the carload rate on grain products of 7 cents per 100 lbs. from Chicago to St. Louis and East St. Louis, which has been made by the Chicago & Eastern Illinois since August 19, will on November 1 be raised. The 7-cent rate now applies on grain products milled or malted from grain originating at points in Wisconsin, Iowa, Minnesota and North and South Dakota, and this will be raised to 7½ cents on malt and 8 cents on other grain products, the same as on other lines.

The Oregon-Washington Railroad & Navigation Company is running throughout its lines in central Oregon a "hog and field pea special," carrying lecturers from the Oregon State Agricultural College. The Southern Railway is running an agricultural special on its lines in eastern Tennessee, a tour of something over three weeks having been laid out. This train is the most elaborate institution of the kind thus far noticed, judging by the number of cars: three lecture coaches, three cars for exhibits, a platform car, also for exhibits, and an Arms palace stock car. The latter is furnished by the Tennessee department of agriculture. The lecturers are from that department and from the state university. The Southern Railway bears the whole of the expense.

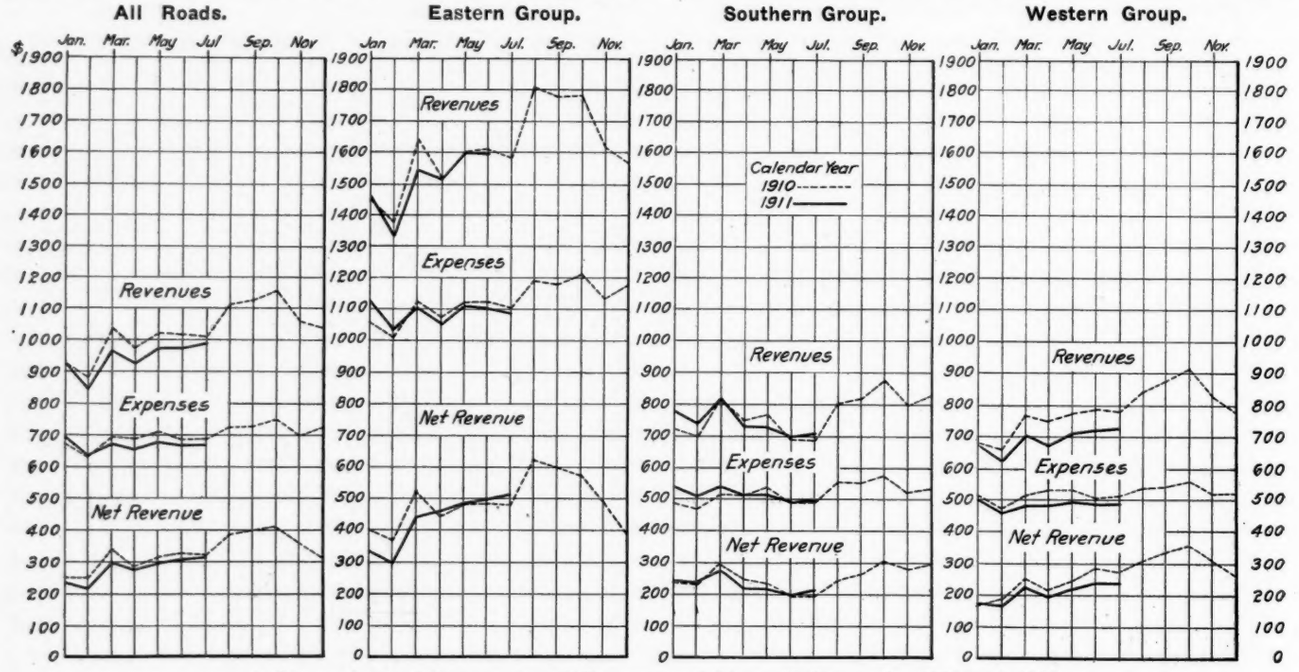
In an effort to force the railways to reduce their lake-and-rail rates on flour from Minneapolis to New York, via Duluth and Buffalo, representatives of the milling interests of Minneapolis have leased two large lake vessels, the "Scranton" and the "Lackawanna," to operate independently in the flour trade on the Great Lakes between Duluth and Buffalo. The millers say that they intend to insist on being allowed to land their vessels at the railway docks in Buffalo and on being given the same divisions of the through rates, as well as the same treatment generally, as the roads give to other vessels engaged in the same traf-

fic. The carriers recently reduced the rate from 23 cents per 100 lbs. to 21½ cents, but on September 28, before the reduced rate became effective, the Interstate Commerce Commission granted the application of the lines leading out of Minneapolis for leave to withdraw it.

Total Railway Revenues and Expenses.

Logan G. McPherson, director of the Bureau of Railway Economics in bulletin Number 20 giving a summary of revenues and expenses of steam roads in the United States for July, 1911, says:

"The railways whose returns are included in this bulletin cover 221,148 miles, or 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of July, 1911, amounted to $218,570,015. This includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources. Compared with July, 1910, these total operating revenues show a decrease of $1,414,327, which is equivalent to $22 per mile of line, or 2.1 per cent. This decrease was due wholly to a decrease in freight revenue amounting to $24 per mile, or 3.7 per cent. There were small increases in the other revenue accounts.



A Comparison of Revenues and Expenses of Steam Railways in 1910 and 1911.

"Operating expenses, which include all the costs of maintaining track and equipment, opering trains, securing traffic, and of administration, amounted to $148,322,468. This was $1,486,003 less than for July, 1910, a decrease which is equivalent to $17 per mile of line, or 2.5 per cent. This was due to decreases in the maintenance of way and structures, traffic and transportation expenditures. In the cost of maintaining way and structures, i. e., track and buildings, there was a decrease compared with July, 1910, of $11 per mile, or 7.3 per cent. Traffic expenses decreased 3 per cent. as compared with July, 1910, while the cost of conducting transportation declined 1.8 per cent.

"Net operating revenue, which is total operating revenues less operating expenses, shows a decrease as compared with July, 1910, of $5 per mile, equivalent to 1.4 per cent. By cutting down operating expenses the railways have been able nearly to overcome the decrease of $22 per mile in operating revenues; but operating expenses have been decreased largely by reducing the amount spent for maintaining way and structures. The net revenue for each mile of line for each day of July averaged $10.25, as compared with $10.39 for July, 1910. It should be recalled that net revenue is gross profits before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments, or dividends. Taxes for the month of July amounted to $8,960,481, or $41 per mile, an increase of 5 per cent. over July, 1910. The operating ratio for July, that is, the per cent. of the total operating revenues which was absorbed in operating expenses, was 67.9 per cent. as compared with 68.6 per cent. in June, 1911, and 68.1 per cent. in July, 1910.

"The western group of railways showed a decrease in total operating revenues per mile as compared with July, 1910, of 7.3 per cent., while the operating revenues per mile of the eastern group increased 1.3 per cent., and of the southern group 3 per cent. over July, 1910. Operating expenses per mile were reduced 4.6 per cent. by the western railways as compared with July, 1910, and by the eastern railways 1.3 per cent., but increased on the southern railways 1.1 per cent. The cost of maintenance of way and structures shows a decrease per mile in every group in comparison with July, 1910. Net operating revenue per mile in the western group declined 12.3 per cent. as compared with July, 1910, while that of the eastern group increased 7.3 per cent., and that of the southern group 7.8 per cent. Taxes increased in all the groups as compared with July, 1910, the increase per mile amounting to 13.4 per cent. in the southern group, and 7.2 per cent. in the eastern group.

"When the monthly averages for the seven months of the calendar year 1911 are compared with those of the corresponding months of 1910, they show decreases in total operating revenues per mile of 3.6 per cent., and in net operating revenue per mile of 7.2 per cent. The greatest relative decrease in net operating revenue was that of 11 per cent. in the western group.

"The diagram shows the variations in operating revenues, operating expenses, and net revenue per mile for the separate months of the calendar year 1910 and of the calendar year 1911 to date. The points on the lines for the different months represent the level attained by the revenues, expenses, and net revenue per mile for the respective months."

The following table shows the per cent. of each class of operating expense to total operating revenues for all the steam railways reporting to the Interstate Commerce Commission:

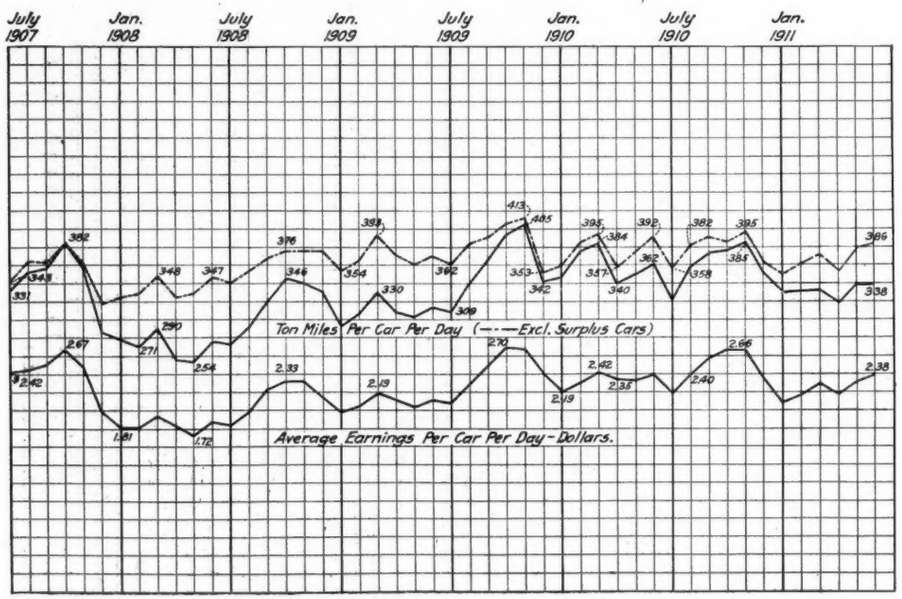
	July 1911.	July 1910.	Fiscal yr. ended June 30, 1911.	Fiscal yr. ended June 30, 1910.
Maintenance of way and structures	14.0	14.8	13.1	13.4
Maintenance of equipment	15.3	15.0	15.3	15.0
Traffic expenses	2.2	2.2	2.1	2.0
Transportation expenses	33.8	33.7	35.5	33.4
General expenses	2.6	2.4	2.6	2.5
Total operating expenses	67.9	68.1	68.6	66.3

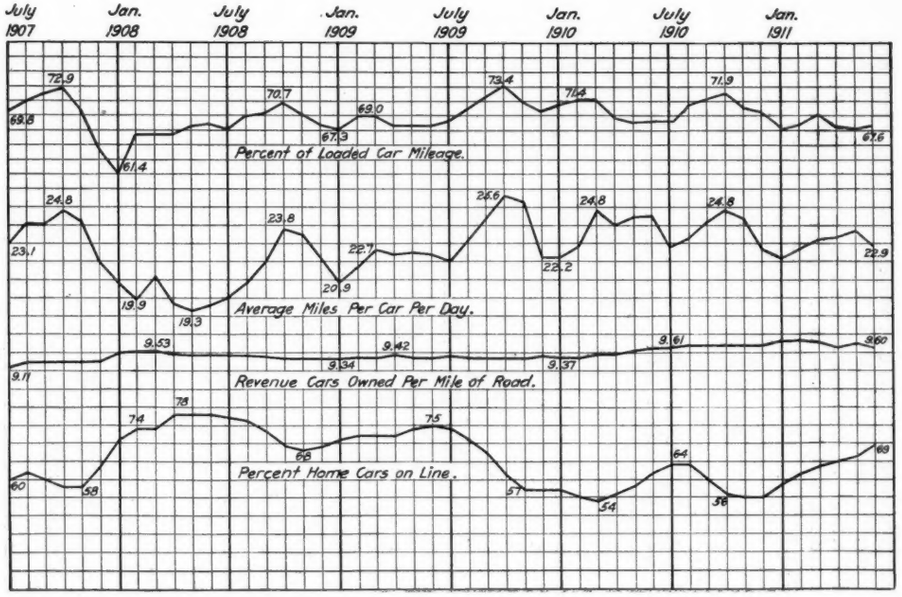
Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting

CAR BALANCE AND PERFORMANCE IN JUNE, 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	79,810	492,618	215,151	183,826	173,394	386,585	18,708	135,339	19,636	143,899	106,540	1,955,506
Average number of system cars on line	46,153	341,167	158,164	120,645	115,535	290,930	7,850	98,202	17,989	69,927	76,386	1,347,948
Railway-owned cars: Average foreign on line	37,925	136,704	70,530	50,271	40,889	93,864	12,342	34,779	10,389	48,689	28,870	565,252
Total Railway-owned cars on line	84,078	477,871	228,694	170,916	156,424	384,794	20,192	132,981	28,378	118,616	105,256	1,908,200
Excess	4,268	.....	13,543	.....	.....	.....	1,484	.....	8,742	.....	.....	.....
Per cent. of cars on line to total owned:												
Home	58	69	73	66	67	75	42	72	92	48	72	69
Foreign	47	28	33	27	23	24	66	26	53	34	27	29
All railways	105	97	106	93	90	99	108	98	145	82	99	98
Private cars on line	3,177	30,778	11,124	3,706	6,828	14,788	1,226	6,454	1,439	11,714	2,884	94,118
Total, all cars on line	87,255	508,649	239,818	174,622	163,252	399,582	21,418	139,435	29,817	130,330	108,140	2,002,318
Per cent. of cars in shop	7.87	9.07	10.05	8.36	11.11	7.61	8.10	10.70	8.42	6.35	6.67	8.88
No. of freight engines owned	1,182	7,598	2,989	3,067	2,618	6,323	525	2,643	575	2,655	2,156	32,331
Average cars on line per freight engine owned	73	67	80	57	62	63	41	53	52	49	50	62
Total freight-car mileage	46,708,152	510,539,692	148,037,096	126,362,668	123,876,832	263,347,487	23,097,281	83,976,005	22,396,569	111,227,294	91,132,810	1,550,701,886
Average miles per car per day	17.8	21.9	20.6	24.1	25.3	22.0	35.9	21.1	25.0	28.4	28.1	22.9
Per cent. loaded mileage	71.6	65.2	66.6	63.0	67.6	70.2	73.7	69.3	65.9	60.6	72.9	67.6
Ton-miles of freight, including company freight	505,907,697	7,893,063,015	2,196,817,857	1,835,210,831	1,569,935,757	2,696,672,876	351,103,074	1,121,297,108	264,828,553	1,635,898,797	1,178,113,052	21,248,848,590
Average ton-miles, including company freight:												
Per car-mile	10.8	15.5	15.9	14.5	12.7	13.7	15.9	13.4	11.8	14.9	12.9	14.4
Per loaded car-mile	15.1	23.7	23.6	23.0	18.8	19.9	21.5	19.5	17.9	21.1	17.7	21.6
Per car per day	193	368	333	350	321	304	597	282	296	422	363	338
Gross freight earnings	$6,042,063	$46,612,682	$12,867,250	$10,484,737	$10,533,478	$27,589,514	$2,777,845	$9,339,133	$2,286,522	$16,150,856	$8,894,669	$153,578,749
Average daily earnings: Per car owned	$2.52	$2.35	$1.99	$1.90	$2.02	$2.38	$4.95	$2.30	$3.88	$3.75	$2.78	$2.42
Per railway car on line	2.40	2.42	1.88	2.04	2.24	2.39	4.59	2.34	2.69	4.57	2.82	2.49
All cars on line	2.31	2.27	1.79	2.00	2.15	2.30	4.32	2.23	2.55	4.16	2.74	2.38





Earnings and Performance of Freight Cars in 1907 to 1911.

statistical bulletin No. 106, covering car balance and performance for June, 1911, says:

"All items of performance show a normal or slightly improved condition over May, 1911, with the exception of average miles per car per day, which decreased from 23.7 to 22.9. The average ton miles per car per day for all cars remained the same (338), while the same item, excluding idle cars increased from 382 in May, 1911, to 386 in June, 1911, indicating a fewer number of idle cars in June.

"Average earnings per car per day increased from $2.33 to $2.38, while the average earnings per car per day excluding idle cars increased from $2.56 to $2.67."

The accompanying table gives figures for car balance and performance by groups for the month of June, and the charts show car earnings and performance for the years 1907 to 1911 inclusive.

INTERSTATE COMMERCE COMMISSION.

The commission has announced that it has reached no final conclusion in the tap line matter. The various lumber carrying roads in the Southwest are willing to maintain the present rate status, and the commission has postponed the date the proposed new tariffs may become effective from November 1 to February 1, 1912.

On complaint of the Oklahoma corporation commission the Interstate Commerce Commission will conduct a hearing at Oklahoma City, Okla., on October 27 on the question of merchandise rates between Oklahoma and Texas points. It has been contended that these rates have been lower from Texas to Oklahoma than from corresponding points in Oklahoma to Texas jobbing centers.

Refusal to Allow Cancellation of Joint Rates.

Pacific National Lumber Company, et al. v. Northern Pacific et al. Opinion by Commissioner Lane:

For ten years there have been in effect joint rates on lumber and lumber products from points on the Tacoma Eastern to points on the Northern Pacific east of Glendive, Mont., and to points on the C. B. & Q. and the Chicago & North Western. These rates were made in accordance with an agreement by which each company promised to give the other all the traffic that it lawfully could, and which also provided that if the Tacoma Eastern should be sold or leased to a competitor of the Northern Pacific, the contract might be terminated on six months' written notice. On the completion of the Chicago, Milwaukee & Puget Sound, this company obtained control of the Tacoma Eastern and published through tariffs to eastern points via its lines. The Northern Pacific, therefore, canceled its tariffs with the Tacoma Eastern. The sole question for consideration herein is whether this route established voluntarily by the Northern Pacific and the Tacoma Eastern, and the joint rates thereunder, should be continued. The Northern Pacific takes the position that inasmuch as the Tacoma Eastern is now, in effect, the property of the Milwaukee, it (the Northern Pacific) should not be required to give the shippers of the Tacoma Eastern through rates over the Northern Pacific in competition with the producers of lumber on the Northern Pacific's own line. The commission refuses to recognize the right of a railway to deprive shippers of access to markets at reasonable rates because of a change in relationship between railways, inasmuch as by the cancellation of these through rates, the total rate from point of origin to destination would be increased. The case falls under the category of those in which the burden of proof is placed upon the railway to justify a proposed increase in rates. No evidence whatever was offered to show that the through rates now existing were not reasonable, or that the increased rates would be reasonable. The Northern Pacific is forbidden, therefore, to cancel the through rates over its lines.

Commissioner Prouty concurring:

I concur in this case, but wish to say that while every shipper is certainly entitled to a reasonable rate to every market, what is reasonable in the construction of through routes and joint tariffs may, in my opinion, sometimes depend on the relation between carriers. A railway may within proper limits protect its own business. (21 I. C. C., 455.)

STATE COMMISSIONS.

The governor of Massachusetts has appointed Garrett Droppers of Williamstown, professor of economics at Williams College, as a railway commissioner, in place of Clinton White.

The Indiana railway commission has ordered the Cincinnati, Bluffton & Chicago to comply with the law requiring railway companies to adopt a book of rules and hold periodical examination of employees. To the surprise of the commission it was found that the road was operating without a book of rules. This company operates a road 52 miles long, from Huntington to Portland.

COURT NEWS.

The supreme court of the state of Washington has handed down a decision affirming the constitutionality of the employers' liability law, which was recently passed by the legislature of that state.

The Supreme Court of the United States has assigned to be heard on January 8, all cases now pending before it involving conflicts between state and federal control of rates, or between interstate and intrastate rates. There are cases from Kentucky, Minnesota, Missouri, Oregon and West Virginia.

The Court of Commerce has denied the application for an injunction against the enforcement of the order of the Interstate Commerce Commission reducing rates on coal from the anthracite region in the state of Pennsylvania to tidewater, which order was issued in the case of Meeker & Co. against the Lehigh Valley.

The government has abandoned its suit against the National Stock Yards at St. Louis, for violation of the 28-hour law, regulating the feeding and watering of live stock in transit. The solicitor general has filed in the Supreme Court a stipulation for affirmance of the judgment of the lower court, which held that a stock yard was not a common carrier, and hence was not subject to the 28-hour law.

Dissolution of the National Electric Lamp Company Ordered.

Judge Killits, in the United States district court for the northern district of Ohio, has ordered the General Electric Company to conduct all its business under its own name, and has ordered the dissolution of the National Electric Lamp Company and about thirty-five subsidiaries. The attorney-general has given out a statement in which he says that the court forbids the practice of fixing the retail price on any style of lamp, whether patented or unpatented. The government claimed that competition on unpatented articles was stifled by a system of contracts with dealers, jobbers and consumers by which they were compelled to purchase from the defendants all their supply of carbon lamps (on which patents had expired), as a condition of the right to buy certain lamps still patented. By aggregating discounts on lamps patented and discounts on lamps not patented, competition on unpatented lamps was suppressed. The General Electric Company and subsidiary companies are enjoined from carrying out certain contracts with manufacturers of bulbs, tubing, and other parts necessary to complete lamps, by which the manufacturers of these parts are bound to sell only to the defendants except on unequal conditions. The attorney general says that "it may be proper to add that the investigation out of which this suit arose also disclosed eleven other patent pools by which the prices of various electrical devices and supplies were fixed, and to which some of the defendants were parties, but since the institution of the suit all of these pools have been voluntarily dissolved." He says that the investigation disclosed a general trade and patent agreement between the General Electric Company and the Westinghouse Electric & Manufacturing Company, covering substantially their whole business, but that this agreement, since the institution of the government suit, has expired by limitation and has not been, and it is believed will not be, renewed. The suit and finding in favor of the government applies only to that part of the General Electric Company's business which has to do with the methods of sale of incandescent electric lamps. The decree was acquiesced in by the defendant companies.

REVENUES AND EXPENSES OF RAILWAYS.

TWO MONTHS OF FISCAL YEAR, 1912. (FOR MONTH OF AUGUST SEE ISSUE OF OCTOBER 12.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$137,618	$92,896	$249,988	$45,757	$49,586	$7,451	$84,506	$10,618	$197,918	$52,070	$110	$9,200	$42,980	—$44,958
Alabama Great Southern	309	426,423	232,107	720,488	87,481	144,475	21,297	221,436	17,152	491,841	228,647	—492	29,496	198,659	11,958
Atchison, Topeka & Santa Fe	7,612[1]	9,048,819	3,891,426	14,055,719	2,581,651	2,387,314	286,674	4,039,758	309,194	9,604,591	4,451,128	.....	549,011	3,902,117	—1,148,337
Atlantic Coast Line	4,494	2,812,483	1,252,645	4,375,238	675,993	765,496	82,056	1,639,385	138,903	3,301,833	1,073,405	.....	214,000	859,405	—35,166
Atlanta & West Point	92	96,969	87,788	202,026	24,476	38,368	10,088	59,260	9,298	141,490	60,536	337	10,378	50,495	16,387
Baltimore & Ohio—System	4,433	11,768,433	2,920,324	15,611,671	2,016,096	2,804,698	324,617	5,081,013	331,349	10,557,773	5,053,898	—66,737	480,699	4,506,462	—12,571
Baltimore & Ohio Chicago Terminal	77	.....	5,636	266,864	71,056	34,462	1,849	104,926	8,307	220,600	46,264	1,647	36,413	11,499	—3,899
Bangor & Aroostook	627*a*	345,136	120,804	501,521	100,034	69,186	8,317	151,892	25,913	355,342	146,179	.....	18,500	127,679	6,528
Bessemer & Lake Erie	203	1,841,134	87,314	1,947,145	164,798	282,860	16,884	403,726	16,241	884,509	1,062,636	.....	14,000	1,048,636	151,001
Boston & Maine	2,224[2]	4,152,035	3,307,036	8,047,979	1,206,552	995,124	82,386	3,310,561	172,625	5,767,248	2,280,731	55,869	344,471	1,992,129	—337,135
Buffalo, Rochester & Pittsburgh	572	1,396,176	237,884	1,689,011	282,317	288,714	21,269	505,971	33,448	1,131,719	557,292	725	34,000	524,017	—68,612
Buffalo & Susquehanna *R. R.*	265	270,519	19,219	302,374	60,925	53,554	2,701	101,554	13,520	232,254	70,120	.....	5,200	64,920	37,173
Buffalo & Susquehanna *Ry*	91	82,796	25,606	112,742	11,170	57,483	1,022	45,719	5,532	120,926	—8,184	—131	2,800	—11,115	—46,735
Butte, Anaconda & Pacific	46	147,712	25,626	184,260	18,772	34,510	1,554	77,049	4,726	136,611	47,649	.....	4,000	43,649	—22,235
Carolina, Clinchfield & Ohio	238	307,892	31,978	348,349	23,483	43,643	10,482	67,876	15,511	160,995	187,354	1,029	14,000	174,383	93,817
Carolina, Clinchfield & Ohio of S. C.	17	14,936	2,960	18,418	926	158	1,885	5,016	782	9,651	8,757	.....	1,000	7,757	455
Central of Georgia	1,915	1,150,104	725,632	2,025,907	286,505	433,454	66,724	690,328	70,625	1,547,636	478,271	15,400	94,800	398,871	—80,043
Central New England	276	418,334	66,879	510,966	96,028	40,212	2,470	135,939	4,917	279,566	231,400	102	18,000	213,502	63,106
Central of New Jersey	671*b*	2,829,327	1,191,760	4,232,120	431,498	607,703	67,349	1,238,517	77,344	2,422,411	1,809,709	163,305	188,028	1,784,987	295,695
Central Vermont	411	435,509	239,503	733,310	94,150	90,758	16,778	314,403	15,471	531,660	201,650	2,065	23,500	180,215	65,921
Charleston & Western Carolina	340	199,892	70,579	285,962	56,896	42,657	5,246	98,486	8,220	211,505	74,457	.....	10,000	64,457	20,015
Chesapeake & Ohio Lines	2,241*c*	4,381,536	1,117,517	5,736,721	696,862	1,053,314	112,333	1,652,033	125,536	3,640,078	2,096,643	8,168	186,200	1,918,611	—14,347
Chicago, Burlington & Quincy	9,074[3]	9,403,723	4,328,683	15,060,121	2,384,360	2,601,137	265,387	4,509,528	377,168	10,137,580	4,922,541	—25,004	528,825	4,368,712	292,907
Chicago & Eastern Illinois	1,275	1,856,413	559,321	2,600,487	313,100	434,535	59,695	852,711	81,935	1,741,976	858,511	—2,856	77,000	778,655	—13,894
Chicago & Erie	269	654,459	134,540	869,040	140,014	165,858	41,654	371,224	18,509	737,259	131,781	.....	27,388	104,393	—44,137
Chicago & Northwestern	7,754[4]	7,850,021	3,912,643	12,907,471	1,866,600	1,598,244	259,457	4,879,087	253,608	8,856,996	4,050,475	7,328	550,000	3,507,803	61,189
Chicago Great Western	1,496	1,390,508	592,850	2,154,448	275,445	321,131	96,474	827,121	69,653	1,589,824	564,624	59	66,074	498,609	—19,104
Chicago, Indiana & Southern	341	503,447	60,764	579,371	92,623	125,279	16,399	215,688	16,863	466,852	112,519	861	27,800	85,580	39,570
Chicago, Milwaukee & Puget Sound	2,058[5]	2,127,827	476,831	2,695,063	184,425	255,953	113,178	936,145	32,458	1,522,160	1,172,903	41,577	158,668	1,055,812	—29,359
Chicago, Milwaukee & St. Paul	7,511	6,620,725	2,823,221	10,539,998	1,886,044	1,494,277	203,021	4,097,049	186,522	7,866,913	2,673,085	18,611	479,668	2,212,028	—708,986
Chicago, Peoria & St. Louis	255	206,518	75,128	295,450	40,395	58,498	14,836	118,884	10,828	243,441	52,009	.....	8,600	43,409	9,153
Chicago, Rock Island & Pacific	7,551*d*	6,173,756	3,554,730	10,933,071	1,769,098	1,534,059	316,046	3,988,660	278,471	7,886,334	2,506,737	—19,568	413,430	2,073,739	—409,138
Chicago, St. Paul, Minneapolis & Omaha	1,743	1,428,604	867,716	2,471,454	493,965	327,875	54,454	924,682	61,270	1,862,246	609,208	3,116	126,037	486,287	—272,327
Chicago, Terre Haute & Southeastern	353	254,026	41,105	302,569	51,110	53,516	5,650	86,372	15,138	211,786	90,783	—274	17,400	73,109	.....
Cincinnati, New Orleans & Texas Pacific	337	1,158,850	320,461	1,557,450	144,653	271,269	38,373	439,510	34,809	928,614	628,836	1,005	43,600	586,241	—34,100
Cincinnati, Hamilton & Dayton	1,014[6]	1,323,134	353,107	1,880,672	202,075	283,857	37,499	728,970	38,815	1,291,216	589,456	.....	76,036	513,420	181,029
Cincinnati, Northern	245	165,682	55,599	233,685	47,544	49,126	6,271	80,238	5,501	188,680	45,005	.....	10,400	34,605	—12,572
Cleveland, Akron & Cincinnati	344[20]	416,101	169,199	630,328	110,325	98,990	7,909	203,665	10,723	431,612	198,736	.....	39,200	159,536	330
Cleveland, Cincinnati, Chicago & St. Louis	2,010*e*	3,353,842	1,633,005	5,410,604	588,133	729,162	184,147	1,923,063	108,314	3,532,819	1,877,785	—3,120	190,000	1,684,665	821,672
Colorado Midland	337	230,599	75,636	336,533	48,564	57,525	14,943	130,896	10,589	262,517	74,016	—343	16,000	57,673	4,312
Colorado Southern	1,247[7]	945,007	355,610	1,387,250	188,372	262,733	23,837	409,620	43,660	928,222	459,028	—1,787	49,400	407,841	2,949
Cumberland Valley	162	327,240	121,897	470,697	88,202	57,160	9,160	149,792	13,719	318,033	152,664	1,085	10,282	143,465	—72,124
Delaware & Hudson Co.—R. R. Dept.	851[8]	2,849,294	766,131	3,750,188	228,522	488,950	47,094	1,195,392	85,674	2,045,632	1,704,556	2,143	94,692	1,612,007	237,693
Delaware, Lackawanna & Western	930	4,401,035	1,499,963	6,303,271	977,690	944,821	132,504	1,760,174	125,421	3,940,610	2,362,661	66,497	287,000	2,142,158	—99,306
Denver & Rio Grande	2,555	2,907,917	1,078,545	4,165,702	599,569	693,939	115,663	1,372,842	96,227	2,878,240	1,287,462	12,872	140,000	1,160,334	—254,108
Denver, Northwestern & Pacific	214	110,163	133,111	253,724	31,549	30,221	6,312	60,153	5,971	134,206	119,518	.....	6,000	113,518	14,288
Detroit & Mackinac	353	123,964	77,677	214,087	36,889	34,461	6,200	65,903	5,528	148,981	65,106	2,737	16,651	51,192	—19,211
Detroit, Toledo & Ironton	441	235,000	34,210	290,250	56,712	33,807	5,508	128,785	11,140	235,952	54,298	199	15,055	39,442	15,196
Duluth & Iron Range	190*f*	1,901,554	45,296	1,967,268	219,037	119,273	2,423	283,333	20,742	644,808	1,322,460	11,564	79,465	1,254,559	—385,956
Duluth, Missabe & Northern	328*g*	2,060,655	84,919	2,167,219	222,726	154,933	4,651	287,348	24,858	694,516	1,472,703	21,239	91,335	1,402,607	—1,601,315
El Paso & Southwestern Co.	901	852,984	156,450	1,067,536	145,391	173,230	25,285	301,201	45,147	690,254	377,282	—3,131	42,151	332,000	—106,207
Elgin, Joliet & Eastern	841*h*	1,475,760	12	1,561,510	135,440	269,295	7,912	436,617	28,436	877,700	683,810	.....	33,450	650,370	254,991
Erie	1,995[9]	6,343,793	1,872,359	8,862,193	1,179,251	1,427,219	196,306	2,633,570	157,714	5,594,060	3,268,133	65,010	249,443	3,083,699	46,506
Florida East Coast	583	224,072	160,950	442,178	105,512	102,721	8,700	186,801	15,929	419,663	22,515	.....	31,000	—8,485	—9,573
Fort Worth & Denver City	454	437,199	315,921	793,622	60,170	113,851	15,673	232,907	24,301	446,902	346,720	—1,648	24,500	320,572	32,935
Galveston, Harrisburg & San Antonio	1,338	1,163,313	511,413	1,768,583	224,342	273,406	58,298	630,033	54,652	1,240,731	527,852	—10,166	60,884	456,802	74,500
Georgia	307	287,821	166,010	484,478	54,558	82,943	22,521	210,102	15,069	385,193	99,285	.....	4,200	95,085	39,638
Grand Rapids & Indiana	587	431,885	427,656	930,073	94,432	124,665	23,421	360,421	28,439	631,378	298,695	—509	45,975	252,211	76,480
Great Northern	7,344[10]	8,190,185	2,772,120	11,746,868	1,758,780	1,297,283	170,798	2,922,079	187,752	6,336,692	5,410,176	55,355	575,397	4,890,134	806,179
Gulf & Ship Island	307	223,665	77,557	322,291	53,140	61,835	3,318	90,146	14,429	222,868	99,423	.....	10,349	89,074	—8,991
Gulf, Colorado & Santa Fe	1,587[11]	1,129,180	566,119	1,807,932	406,374	305,983	49,679	686,329	63,494	1,511,859	296,073	.....	71,523	224,550	—81,947
Houston & Texas Central	789	653,846	339,061	1,063,486	169,221	135,447	38,194	394,529	42,720	780,111	283,375	—3,010	35,667	244,698	3,631
Houston, East & West Texas	190	127,970	64,194	204,918	38,771	21,282	3,751	61,161	7,151	132,116	72,802	.....	6,709	66,093	—23,153
Illinois Central	4,755*i*	6,764,612	2,507,555	10,597,140	1,632,361	2,243,406	246,710	3,671,194	258,220	8,051,891	2,545,249	—16,086	461,523	2,067,640	—46,168
Iowa Central	558	419,121	110,127	556,633	75,964	98,138	14,605	223,331	16,200	428,238	128,395	.....	19,266	109,129	10,799
Kanawha & Michigan	175	525,203	65,298	601,372	73,168	96,939	4,780	159,777	13,704	348,369	253,003	—39	18,435	234,529	12,987
Kansas City Southern	827	1,066,771	299,457	1,543,373	161,218	216,451	51,818	547,163	58,111	1,034,761	508,612	.....	69,223	439,389	—128,802
Lake Erie & Western	886	740,722	207,370	998,632	123,677	154,054	27,191	361,808	22,574	689,304	309,328	.....	39,751	269,577	71,776
Lake Shore & Michigan Southern	1,662	5,262,983	2,473,948	8,776,556	963,530	1,111,227	197,188	2,486,214	146,552	4,904,711	3,871,845	7,510	270,000	3,609,355	1,253,452
Lehigh & Hudson River	96	225,145	10,654	240,613	35,425	36,943	2,156	77,523	9,367	161,414	79,199	.....	7,000	72,199	6,673
Lehigh Valley	1,429	5,210,425	1,086,881	6,515,141	730,291	1,074,923	163,341	2,088,746	133,248	4,190,549	2,324,592	—49,337	210,400	2,064,855	213,176
Long Island	398	523,115	1,785,840	2,403,477	234,798	201,729	37,156	834,634	38,285	1,346,602	1,056,875	190,666	107,107	1,140,434	133,661
Louisiana & Arkansas	255	159,738	37,539	206,147	51,833	36,344	4,581	57,259	9,648	159,665	46,482	.....	6,400	40,082	—52,232
Louisiana Ry. & Nav. Co.	350	221,700	49,719	292,807	44,164	28,887	11,430	106,399	13,013	203,893	88,914	.....	9,200	79,714	33,822
Louisiana Western	207	198,753	110,451	323,069	39,514	58,211	15,381	94,721	13,570	221,397	101,672	1,097	12,556	90,213	—1,282
Louisville & Nashville	4,643[12]	6,193,461	2,187,348	8,879,831	1,409,863	1,653,322	181,079	2,795,798	168,994	6,209,056	2,670,775	3,727	297,900	2,376,602	295,422

REVENUES AND EXPENSES OF RAILWAYS.

TWO MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Louisville, Henderson & St. Louis	199	123,405	77,056	212,425	59,501	24,018	8,628	64,926	6,343	163,415	49,010	715	6,000	43,725	—3,072
Maine Central	1,165	986,717	784,562	1,884,806	413,495	197,291	21,006	634,318	43,393	1,309,503	573,303	749	82,623	493,429	63,024
Michigan Central	1,804*j*	3,006,105	1,685,164	5,163,849	493,033	481,740	150,421	1,831,897	90,596	3,047,687	2,116,162	11,182	220,000	1,907,344	646,670
Midland Valley	323	138,114	70,177	222,548	57,501	43,409	7,061	73,605	10,916	192,492	30,056	.....	10,969	19,087	13,773
Minneapolis & St. Louis	1,027	464,588	248,639	773,856	85,231	103,818	20,812	319,423	23,456	552,740	221,116	—3	38,090	183,023	—49,597
Missouri, Kansas & Texas	1,743	1,805,971	791,119	2,792,428	532,011	456,128	68,020	878,532	85,071	2,019,762	772,666	—1,675	117,000	663,991	42,280
Mobile & Ohio	1,114	1,273,231	267,673	1,793,904	225,821	336,346	61,510	647,806	61,167	1,332,650	461,254	—2,664	49,190	409,400	—19,998
Monongahela	65	180,132	4,798	187,599	37,045	15,553	466	40,248	3,838	97,150	90,449	.....	3,800	86,649	300
Morgan's La. & Tex. R. R. & S. S. Co.	404*k*	472,381	207,350	715,808	98,233	114,312	27,625	273,286	25,484	538,940	176,868	—6,268	37,396	133,204	8,284
Nashville, Chattanooga & St. Louis	1,255	1,317,878	543,667	1,990,139	319,216	363,654	73,074	714,391	49,083	1,519,418	470,721	—1,804	47,632	421,285	22,061
Nevada Northern	165	217,979	21,845	245,687	28,305	28,918	869	49,110	6,755	113,957	131,730	.....	9,425	122,305	—9,068
New Orleans & North Eastern	195	394,360	109,085	540,705	55,071	101,999	18,530	190,350	22,502	388,452	152,253	—1,449	18,500	132,303	—56,125
New Orleans Great Northern	282	199,886	63,293	281,145	37,953	37,347	5,817	87,322	13,650	181,589	99,556	—116	4,000	95,440	—26,640
New Orleans, Mobile & Chicago	404	205,087	66,080	289,698	50,438	31,375	5,509	90,812	15,055	193,189	96,509	—373	8,985	87,151	—5,036
New York, New Haven & Hartford	2,091	4,928,427	4,916,767	10,795,728	1,217,103	1,239,909	58,434	3,923,891	300,640	6,739,977	4,055,751	248,866	610,000	3,694,617	—4,132
New York Central & Hudson River	3,591	9,775,643	6,597,849	18,512,003	2,442,552	2,366,584	396,271	6,120,372	454,191	11,779,970	6,372,033	39,406	832,441	5,578,998	1,443,067
New York, Chicago & St. Louis	561	1,493,209	348,251	1,915,325	259,389	183,431	91,770	738,270	33,565	1,306,425	608,900	—1,819	78,000	529,081	77,233
New York, Ontario & Western	565[13]	1,190,040	609,129	1,884,009	260,499	287,008	19,686	608,375	31,359	1,206,927	677,082	6,104	35,833	647,353	111,270
New York, Philadelphia & Norfolk	112	479,947	95,088	617,774	69,089	98,706	8,259	226,325	24,175	426,554	191,220	.....	15,000	176,220	—33,676
New York, Susquehanna & Western	152	344,112	115,225	513,223	66,806	46,157	4,167	180,635	8,317	306,082	207,141	5,317	35,747	176,711	44,671
Norfolk & Western	2,004[14]	5,502,704	827,814	6,545,573	891,405	1,180,829	98,546	1,778,291	114,005	4,063,076	2,482,497	—5,609	230,000	2,246,888	245,803
Norfolk Southern	607	289,090	174,275	515,583	57,993	64,874	12,279	169,450	24,994	329,590	185,993	—1,750	15,000	169,243	3,051
Northern Central	472	1,464,647	433,368	2,014,005	268,090	398,925	30,224	973,846	45,083	1,716,168	297,837	1,588	80,673	218,752	—105,090
Northern Pacific	6,016[15]	6,706,448	3,326,956	10,756,589	1,693,016	1,273,834	203,366	3,210,471	164,254	6,544,941	4,211,648	95,959	537,830	3,769,777	—853,088
Oregon Short Line	1,667[16]	2,327,309	973,139	3,484,455	507,189	344,865	56,919	752,333	69,139	1,730,445	1,754,010	—57	153,773	1,600,180	—35,054
Oregon-Washington R. R. & Nav. Co.	1,855	1,755,849	1,013,555	2,938,154	427,498	261,789	84,491	946,054	78,160	1,797,992	1,140,162	15,160	149,081	1,006,241	—
Pecos & Northern Texas	296*l*	189,344	59,949	261,717	38,276	54,297	4,421	80,422	9,071	186,487	75,230	.....	6,893	68,337	—27,588
Pennsylvania *Co.*	1,415	7,022,464	1,669,522	9,399,345	1,106,245	1,546,818	147,189	2,938,559	170,861	5,909,672	3,489,673	—4,752	344,546	3,140,375	—187,119
Pennsylvania *R. R.*	3,978	18,378,094	6,417,092	26,484,725	2,968,715	5,040,243	353,927	9,457,165	672,305	18,492,355	7,992,370	—264,568	1,211,862	6,515,940	—433,694
Peoria & Eastern	351	375,377	131,259	550,325	83,892	71,101	13,396	218,581	11,894	398,864	151,461	.....	21,000	130,461	—15,250
Pere Marquette	2,331	1,685,854	946,477	2,877,277	336,534	410,833	80,323	1,204,992	63,599	2,096,281	780,996	—8,682	112,487	659,826	—27,727
Philadelphia, Baltimore & Washington	713	1,661,982	1,333,617	3,297,518	421,656	546,998	50,700	1,267,613	66,838	2,553,806	943,713	.....	101,395	842,318	—14,410
Pittsburgh & Lake Erie	215*m*	2,520,797	313,935	2,918,128	292,645	381,418	32,869	618,886	47,994	1,373,812	1,044,316	—281	60,000	1,484,035	—214,836
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467	4,564,407	1,518,307	6,801,389	1,074,698	1,232,701	137,189	2,246,689	128,825	4,818,102	1,983,287	—2,300	256,796	1,724,191	129,764
Richmond, Fredericksburg & Potomac	83	204,781	126,358	379,701	42,105	49,313	5,644	140,146	11,173	248,381	131,320	.....	2,000	129,320	2,323
Rutland	468	311,973	246,954	632,538	86,377	96,302	16,827	229,398	12,816	441,720	190,818	.....	23,546	167,272	—24,244
San Antonio & Aransas Pass	727	503,546	34,137	778,736	124,295	92,430	6,319	83,977	10,539	173,026	110,059	.....	8,666	101,393	10,547
Santa Fe, Prescott & Phoenix	364	192,788	73,034	283,085	43,965	28,226	11,050	266,547	18,614	512,936	265,800	.....	22,000	243,800	6,932
St. Joseph & Grand Island	319	189,615	86,603	300,616	50,719	35,028	11,269	112,943	10,612	220,570	80,046	—69	11,423	68,554	40,602
St. Louis, Brownsville & Mexico	509[17]	221,384	114,123	365,306	78,909	21,900	5,646	125,153	16,327	247,935	117,371	.....	9,000	108,371	71,948
St. Louis Merchants Bridge Terminal	9	.....	521	254,855	59,883	15,032	921	140,547	9,792	226,175	28,680	.....	11,400	17,280	—89,560
St. Louis, San Francisco & Texas	243*n*	105,853	59,681	179,770	28,456	36,101	5,919	90,520	8,816	169,812	9,958	.....	2,721	7,237	1,562
St. Louis Southwestern	796	852,308	241,934	1,147,545	93,014	218,056	49,923	283,858	42,950	687,801	459,744	—1,563	39,128	419,053	4,058
St. Louis Southwestern of Texas	703	381,491	184,235	608,401	92,200	160,817	22,301	244,387	30,977	550,682	57,719	—409	20,000	37,310	79,042
San Pedro, Los Angeles & Salt Lake	1,113	850,798	543,451	1,479,614	298,880	293,065	61,350	554,685	33,500	1,241,480	238,134	—6,657	49,675	181,802	—4,425
Southern Kansas of Texas	124	165,581	31,833	205,506	24,875	37,286	4,139	73,370	8,394	148,064	57,442	.....	3,961	53,481	1,246
Southern	7,088[18]	6,025,543	3,251,587	10,062,927	1,170,511	1,617,738	276,293	3,434,883	287,507	6,786,932	3,275,995	5,739	393,548	2,888,186	161,150
Southern in Mississippi	280	78,401	70,486	164,200	46,628	19,234	3,799	67,140	7,160	143,961	20,239	.....	10,433	9,806	6,821
Southern Pacific Co.	6,182*o*	8,743,863	5,886,467	15,675,982	2,144,533	1,774,993	389,566	4,198,656	418,947	8,926,695	6,749,287	15,107	602,288	6,162,106	—940,626
Sunset	58	161,966	35,302	204,098	22,737	2,639	49	43,769	690	69,884	134,215	.....	6,779	127,436	11,748
Syracuse, Binghamton & New York	80	94,368	76,362	195,054	40,061	11,754	5,475	59,790	4,526	121,606	73,448	.....	12,440	61,008	—11,878
Tennessee Central	293	185,202	74,585	273,834	43,658	36,779	10,102	94,242	22,510	207,291	66,543	.....	8,424	58,119	—35,680
Terminal R. R. Ass'n of St. Louis	35	.....	476	408,243	70,970	46,802	1,351	139,673	10,200	268,996	139,247	16,858	52,000	104,105	—49,683
Texas & New Orleans	458	397,883	179,052	614,135	121,018	113,097	13,947	221,516	18,856	488,434	125,701	—2,160	24,496	99,045	—26,400
Texas & Pacific	1,884	1,529,187	723,517	2,419,876	323,072	428,650	50,483	1,005,605	85,989	1,893,799	526,077	1,265	76,000	451,342	192,151
Toledo & Ohio Central	440	753,216	144,948	950,323	125,459	113,496	15,402	295,866	17,327	567,550	382,773	—1,727	46,050	334,996	—38,089
Toledo, Peoria & Western	247	124,838	83,744	219,957	35,957	46,038	4,437	80,274	6,738	173,444	46,513	.....	9,600	36,913	—3,526
Union R. R. of Baltimore	9	205,180	41,190	249,029	17,614	.....	1,922	11,305	4,522	35,363	213,666	.....	11,846	201,820	—24,948
Union R. R. of Pennsylvania	31	.....	.....	873,846	55,362	169,614	207	264,217	4,726	494,127	379,719	7,359	6,500	380,578	53,232
Union Pacific	3,497[19]	5,642,615	2,068,445	8,282,184	919,764	853,406	231,177	2,097,221	196,597	4,298,164	3,984,019	4,896	303,300	3,685,615	—834,693
Vandalia	827	1,076,184	456,139	1,719,520	310,507	311,974	58,353	620,811	40,334	1,341,979	377,541	.....	55,702	321,839	—32,049
Vicksburg, Shreveport & Pacific	171	112,042	88,466	219,495	41,563	48,260	6,579	70,974	9,323	176,699	42,796	—1,142	12,600	29,054	—41,008
Virginian	474	673,681	56,684	752,115	88,613	125,933	10,203	186,859	16,059	427,667	324,448	9,134	34,600	298,982	109,920
Virginia & Southwestern	240*p*	240,253	30,753	278,165	32,541	52,561	3,668	76,224	7,472	172,466	105,699	.....	9,420	96,279	31,441
Wabash	2,515	3,294,196	1,460,873	5,148,082	688,598	852,960	168,351	1,864,408	163,731	3,738,048	1,410,034	998	143,311	1,267,721	160,646
Washington Southern	35	70,015	65,497	180,956	35,665	23,792	2,460	69,346	6,924	136,187	44,769	.....	6,489	38,280	—35,379
West Jersey & Seashore	355	313,544	1,324,789	1,725,936	170,111	210,533	29,281	544,966	20,274	975,165	750,771	—7,001	46,947	696,823	—69,616
Western Ry. of Alabama	133	108,706	81,422	206,850	39,892	43,853	10,261	58,763	11,533	164,302	42,548	—387	9,225	32,936	6,453
Wheeling & Lake Erie	514	1,163,528	132,530	1,380,793	183,568	230,046	13,933	397,972	26,463	851,982	528,811	3,161	52,770	479,202	22,261
Yazoo & Mississippi Valley	1,371	972,708	459,143	1,540,381	340,618	230,058	32,768	541,547	49,787	1,194,779	345,602	—652	76,000	268,949	179,716

Mileage operated on August 31, 1910—[1] 7,548 miles; [2] 2,242 miles; [3] 9,024 miles; [4] 7,652 miles; [5] 1,711 miles; [6] 1,031 miles; [7] 1,194 miles; [8] 819 miles; [9] 1,959 miles; [10] 7,274 miles; [11] 1,518 miles; [12] 4,590 miles; [13] 545 miles; [14] 1,951 miles; [15] 5,814 miles; [16] 1,594 miles; [17] 494 miles; [18] 7,052 miles; [19] 3,411 miles; [20] includes Cleveland, Akron & Columbus and Cincinnati & Muskingum Valley for both years; — indicates deficits, losses and decreases.

Mileage operated on August 31, 1910—*a*, 599 miles; *b*, 631 miles; *c*, 2,224 miles; *d*, 7,395 miles; *e*, 1,982 miles; *f*, 167 miles; *g*, 293 miles; *h*, 808 miles; *i*, 4,552 miles; *j*, 1,746 miles; *k*, 348 miles; *l*, 225 miles; *m*, 191 miles; *n*, 193 miles; *o*, 6,147 miles; *p*, 188 miles; — indicates deficits, losses and decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. N. Neff has been elected vice-president of the Dallas Terminal Railway & Union Depot Company, succeeding the late J. W. Maxwell.

W. B. Scott, assistant director of maintenance and operation of the Southern Pacific, the Union Pacific, the Oregon-Washington Railroad & Navigation Company and the Oregon Short Line, at Chicago, has been elected vice-president in charge of maintenance and operation and general manager of the Union Pacific, with office at Omaha, Neb., succeeding A. L. Mohler, elected president, his election becoming effective November 1. J. A. Munroe, freight traffic manager of the Union Pacific at Omaha, has been elected vice-president in charge of traffic, with office at Omaha. T. M. Orr, assistant general manager, has been appointed assistant to the president.

Robert S. Logan, who has been elected vice-president of the Grand Trunk, in charge of land, tax, claims and mail departments, with office at Montreal, Que., as has been announced in these columns, was born on February 13, 1864, at St. Louis, Mo., and was educated in the public schools of this native town. He began railway work on October 1, 1885, as a clerk in the office of the general manager of the Wabash, St. Louis & Pacific, and from December, 1890, to July, 1896, was secretary to the general manager of its successor, the Wabash Railroad. He was then appointed secretary to the general manager of the Grand Trunk, and from January, 1901, to March 15, was assistant to the general manager of the same road. Mr. Logan was elected vice-president and general manager of the Central Vermont on March 15, 1901, and the following March was appointed assistant to second vice-president of the Grand Trunk. Since January, 1910, he was assistant to president of the Grand Trunk and the Grand Trunk Pacific, and now becomes vice-president of the Grand Trunk, as above noted.

D. E. Galloway, whose appointment as assistant to president of the Grand Trunk, and the Grand Trunk Pacific, with office at Montreal, Que., has been announced in these columns, was born in the township of Puslinch, Ont., on August 31, 1882, and was educated in the high schools and later at business college. He entered the service of the Grand Trunk in February, 1901, in the office of the claims department at Hamilton, and in November of the same year was transferred to Montreal, Que., in the claims department under Vice-President W. Wainwright. His next position was in the general freight department of the same road. Mr. Galloway was appointed private secretary to President Charles M. Hays in September, 1904, which position he held at the time of his recent appointment as assistant to president as above.

D. E. Galloway.

Operating Officers.

A. A. Matthews has been appointed assistant general manager of the Texas Central, with office at Waco, Tex., succeeding J. B. Gilmer.

J. H. Stevens has been appointed acting superintendent of the Corvallis & Eastern, with office at Albany, Ore., succeeding J. T. Walch, deceased.

N. L. Howard has been appointed trainmaster of the Chicago, Burlington & Quincy, with office at Centerville, Iowa, succeeding N. C. Allen, transferred.

O. L. Dickeson, who a few months ago was elected vice-president of the White Pass & Yukon Route, with office at Vancouver, B. C., has been appointed also general manager.

Grant Hall, superintendent of motive power of the western lines of the Canadian Pacific at Winnipeg, Man., has been appointed assistant general manager, with office at Winnipeg. See item under Engineering and Rolling Stock Officers.

F. M. Nowell, superintendent of the Bangor & Portland division, of the Delaware, Lackawanna & Western, at Easton, Pa., has been appointed superintendent of the Scranton division, succeeding J. J. McCann, who will assume other duties, and J. R. Hamilton, general yardmaster at Buffalo, N. Y., has been transferred to Hoboken, N. J.

Robert M. White, whose appointment as superintendent of the Bangor & Portland division of the Delaware, Lackawanna & Western, with office at Easton, Pa., has been announced in these columns, was born in 1873 at Elmira, N. Y. Mr. White was a special student at the Lehigh University, and began railway work in May, 1893, in the engineering department of the Erie Railroad, as a chainman, and was later rodman, assistant engineer and acting supervisor on the same road. He left the service of that company in 1900 to go to the Mexican Coal & Coke Co. as assistant engineer and roadmaster, and from 1901, to September, 1908, he was resident engineer and roadmaster of the Delaware, Lackawana & Western, with office at Buffalo, N. Y. Mr. White was promoted to division engineer, with office at Scranton, Pa. in September, 1908, which position he held at the time of his recent appointment, as superintendent of the Bangor & Portland division.

R. M. White.

H. R. Laughlin, superintendent of the Monongah division, of the Baltimore & Ohio, at Grafton, W. Va., has been transferred to the general manager's staff at Baltimore, Md. J. F. Keegan, superintendent of the Wheeling division, at Wheeling, W. Va., succeeds Mr. Laughlin. H. B. Green, assistant superintendent of the Cleveland division, at Cleveland, Ohio, has been appointed superintendent at Wheeling, and W. T. Lechlider, inspector of transportation at Baltimore, Md., has been promoted to assistant superintendent at Cleveland, Ohio.

J. W. Walton, general superintendent of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed acting assistant general manager of the lines in Texas, with office at Dallas, Tex., succeeding C. M. Bryant, granted leave of absence on account of ill health. W. E. Williams, recently appointed superintendent at Sedalia, Mo., has been appointed acting general superintendent at St. Louis, succeeding Mr. Walton, and K. A. Easley, recently appointed superintendent at McAlester, Okla., succeeds Mr. Williams. J. F. Hickey, assistant superintendent at McAlester, succeeds Mr. Easley, and R. R. Farmer succeeds Mr. Hickey.

Jesse G. June, who was recently appointed assistant superintendent of terminals of the Erie Railroad at Jersey City, N. J., as has been announced in these columns, was born March 15, 1866 at Manlius, N. Y. He received a high school education and began railway work in July, 1884, in the engineering department of the Lehigh Valley. In 1901, he was appointed

supervisor of tracks at Easton, Pa., and in 1904 was made superintendent of the trolley lines of the Easton Transit Company. In December of the same year he was appointed division engineer of the Lehigh Valley at Auburn, N. Y., and in April, 1906, was transferred, in the same capacity, to Sayre, Pa. He was again transferred, as division engineer in September, 1907, to Easton. In March, 1908, he went to the Union Pacific as roadmaster at Green River, Wyo. The following December he went to the Erie Railroad as supervisor of tracks, and at the time of his recent appointment, was division engineer at Jersey City, N. J.

Traffic Officers.

W. G. Bowman has been appointed agent and customs broker for the Southern Pacific at Nogales, Sonora, Mex.

E. D. Moffett has been appointed traveling agent of the South Dakota Central, with office at Sioux Falls, S. D.

Doswell Brown, general passenger agent of the Jonesboro, Lake City & Eastern, with office at Jonesboro, Ark., has resigned.

Clinton McCullough, traveling agent of the Chicago & North Western at Chicago, has been appointed general coal agent, with office at Chicago.

A. F. Read, foreign freight agent of the Grand Trunk at Montreal, Que., has been appointed general foreign freight agent, with office at Montreal.

W. V. Howard, local freight agent of the Chicago Great Western at Leavenworth, Kan., has been appointed general agent, with office at Leavenworth.

S. L. Strauss has been appointed chief of tariff bureau of the Grand Trunk Pacific for the lines west of Detroit and St. Claire rivers, with office at Chicago.

Eugene Morris, assistant chairman of the Central Freight Association, has been elected chairman, with office at Chicago, succeeding Joseph F. Tucker, deceased.

G. F. Herr, assistant general passenger agent of the Western Pacific at San Francisco, Cal., has been appointed general passenger agent with office at San Francisco.

V. Kistler, district freight and passenger agent of the Great Northern at Grand Forks, B. C., has been appointed contracting freight agent, with office at Portland, Ore.

J. F. Davidson has been appointed district freight and passenger agent of the Oregon-Washington Railroad & Navigation Company, with headquarters at Aberdeen, Wash.

E. Ford, auditor and car accountant of the Groveton, Lufkin & Northern at Groveton, Tex., has been appointed general freight and passenger agent, with office at Grovton.

H. J. Gribling has been appointed soliciting freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, succeeding John S. Moses, promoted.

H. E. Heller, general agent in the freight and passenger department of the Chicago, Burlington & Quincy, at Philadelphia, Pa., has been appointed general agent at Kansas City, Mo., succeeding W. H. Hill, transferred.

L. B. Hendrix has been appointed district passenger agent of the Chicago Great Western, with headquarters at Pittsburgh, Pa., and Buffalo, N. Y., succeeding W. D. Jones, resigned to go to the Tennessee Central.

H. W. Bechtell, commercial agent of the Louisiana Railway & Navigation Company at New Orleans, La., has been appointed division freight agent of the Texas & Pacific in charge of southern Louisiana territory, with office at New Orleans.

James F. Murdy, soliciting agent of the Louisiana Railway & Navigation Company, at New Orleans, La., has been appointed a commercial agent, with office at New Orleans, succeeding H. W. Bechtell, resigned to go to another company, and F. W. Ernest succeeds Mr. Murdy.

H. G. Grant, soliciting freight and passenger agent of the Norfolk & Western at Cincinnati, Ohio, has been appointed traveling passenger agent, with office at Chicago, succeeding R. E. Scott, resigned to become city passenger agent of the Denver & Rio Grande at Chicago.

Robert E. Davis has been appointed commercial agent of the Georgia Southern & Florida, with office at Miami, Fla., and the following have been appointed soliciting freight agents: Elmer K. Yaeger, Chicago; Charles N. McNulty, St. Louis, Mo., and Truman N. Bradshore, Atlanta, Ga.

R. C. Kennedy, general agent in the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis, at Louisville, Ky., has been appointed southwestern passenger agent, with office at St. Louis, Mo., succeeding to the duties of Charles Krotzenberger, assistant general passenger agent, resigned.

William Austin, general agent in the freight department of the Chicago, Burlington & Quincy at Cincinnati, Ohio, has been appointed general agent in the freight and passenger departments, with office at Philadelphia, Pa., succeeding H. E. Heller, transferred, and H. K. Miles, traveling freight agent at Cincinnati, succeeds Mr. Austin.

W. G. Trapp, soliciting freight agent of the Tennessee Central at Chicago, has been appointed traveling freight agent, with office at Chicago. As has been announced in these columns, W. D. Jones has been appointed soliciting freight agent, succeeding Mr. Trapp. S. A. Cherry has been appointed contracting freight agent, with headquarters at Hopkinsville, Ky.

C. A. Hayes, general freight agent of the Grand Trunk, at Montreal, Que., has been appointed freight traffic manager, with office at Montreal, succeeding John W. Loud, who was retired recently, as has been announced in these columns, and Robert L. Burnap, assistant general freight agent at Chicago, has been appointed assistant freight traffic manager, with office at Chicago. H. C. Martin, second assistant general freight agent at Chicago, has been appointed general freight agent, with office at Montreal.

W. C. Knowles has been appointed assistant general passenger agent of the International & Great Northern, with office at Houston, Tex., and W. E. Fitch has been appointed district passenger agent, with office at San Antonio, Tex. J. F. Zurn, recently appointed district passenger and ticket agent of the Texas & Pacific, with office at Fort Worth, Tex., has had his jurisdiction extended over the International & Great Northern. M. L. Morris, passenger and ticket agent at Houston, has been appointed district passenger agent, with office at Houston.

A. J. Dutcher, general agent of the Union Pacific, who recently had his office removed from Atlanta, Ga., to Birmingham, Ala., has been appointed general agent in the freight and passenger departments, with office at St. Louis, Mo., succeeding J. G. Lowe. O. P. Bartlett, general agent of the Louisville & Nashville at New Orleans, La., succeeds Mr. Dutcher. Joseph E. Maynard has been appointed contracting freight agent of the Union Pacific, with office at Chicago, succeeding John T. Farmer, resigned. J. Brown has been appointed traveling freight and passenger agent, and J. J. Angell has been appointed contracting freight agent, both with offices at Birmingham, Ala.

A. D. Bell, chief clerk to the general passenger agent of the St. Louis Southwestern at Tyler, Tex., has been appointed assistant general passenger and ticket agent of the Texas & Pacific, with office at Dallas, Tex., succeeding C. P. Fegan, appointed district passenger and ticket agent at Dallas. J. F. Zurn, general agent in the passenger department at Fort Worth, Tex., has been appointed district passenger and ticket agent, with office at Fort Worth, and O. B. Webb, passenger and ticket agent at New Orleans, La., has been appointed district passenger and ticket agent, with office at New Orleans. The offices of district passenger and ticket agent at Dallas, Fort Worth and New Orleans were created effective October 15.

J. H. Lipsey, traveling freight agent of the Illinois Central at Mattoon, Ill., has been transferred to Bloomington, Ill., succeeding C. C. Backus, assigned to duties in the general freight

offices at Chicago, and H. E. Cusic, traveling freight agent at Carbondale, Ill., succeeds Mr. Lipsey. B. G. Day, contracting freight agent at Peoria, Ill., has been appointed traveling freight agent at Carbondale, succeeding Mr. Cusic, and W. F. Robinson, chief clerk in the Peoria freight office, succeeds Mr. Day. Julius Rosenzweig has been appointed traveling freight agent, with office at Waterloo, Iowa, and J. F. Barber has been appointed a traveling passenger agent, with office at Freeport, Ill. Freeman Bradford has been appointed contracting freight agent at Omaha, Neb., and T. A. Lewis, a contracting freight agent at Sioux City, Iowa. Ben Stone, contracting freight agent at Dubuque, Iowa, has been appointed traveling freight agent, with office at Fort Dodge, Iowa, succeeding F. E. Munger, assigned to other duties, and E. W. Stafford succeeds Mr. Stone.

George Dow Hunter, whose appointment as general passenger and ticket agent of the Texas & Pacific, with office at Dallas, Tex., has been announced in these columns, was born April 18, 1867, at Bloomington, Ind. He received a public school education, and began railway work in January, 1886, with the Galveston, Harrisburg & San Antonio, as a clerk in the roadmaster's office, at El Paso, Tex. He was subsequently station baggage master, ticket clerk and local freight office clerk with that road; was in Mexico with the Mexican Central, first in the material department, and later in the construction department, and then returned to El Paso to become city ticket agent of the Texas & Pacific. In June, 1889, he was appointed joint ticket agent of the International & Great Northern and the Missouri, Kansas & Texas at Taylor, Tex., and in the latter part of the next year went to Houston as city passenger and ticket agent of the International & Great Northern. He was promoted to assistant general passenger agent at Palestine, Tex., in August, 1905, and to general eastern traffice agent, with office in New York City, in December, 1907. From June 1, 1911, until the time of his appointment as above he had jurisdiction also over the Texas & Pacific.

G. D. Hunter

Engineering and Rolling Stock Officers.

D. B. McKenna, foreman of the car department of the International & Great Northern, with office at Palestine, Tex., has resigned.

Marion Morris has been appointed signal supervisor of the Chicago & Alton, with office at Marshall, Mo., succeeding J. R. Lyons, resigned.

A. G. Kantmann has been appointed acting superintendent of machinery of the Nashville, Chattanooga & St. Louis, with office at Nashville, Tenn.

W. R. Duff, general car foreman of the Trinity & Brazos Valley at Teague, Tex., has been appointed master car builder of the International & Great Northern, with office at Palestine, Tex.

Joseph Quigley, master mechanic of the Alabama Great Southern at Birmingham, Ala., has been appointed master mechanic of the Cincinnati, New Orleans & Texas Pacific, with office at Ferguson, Ky., succeeding T. O. Sechrist, resigned. H. B. Hayes, general foreman of the Chattanooga shops, succeeds Mr. Quigley, and H. F. Campbell succeeds Mr. Hayes.

J. G. Sullivan, assistant chief engineer of the western lines of the Canadian Pacific at Winnipeg, Man., has been appointed chief engineer of the western lines, with office at Winnipeg, and his former title has been abolished. Grant Hall, superintendent of motive power of the western lines, having been appointed assistant general manager, C. H. Temple, assistant superintendent of motive power, succeeds Mr. Hall, with office at Winnipeg.

Charles E. Roland, whose appointment as assistant engineer of maintenance of way of the Kentucky & Indiana general division, of the Chesapeake & Ohio, with office at Covington, Ky., has been announced in these columns, was born January 21, 1888, at Greenville, Ohio, and was educated at the Wayne Technical Academy. He began railway work in January, 1910, with the Cleveland, Cincinnati, Chicago & St. Louis, in the office of the chief engineer at Cincinnati, Ohio. Previous to this he had been with the Stonner Land & Construction Company in western Canada, and with the city engineer and county engineer at Greenville, Ohio. Mr. Roland was appointed assistant to the division engineer of the Chesapeake & Ohio, with office at Peru, Ind., on July 1, 1910, which position he held at the time of his recent appointment of assistant engineer of maintenance of way, as above noted.

Charles D. Young, who has been appointed engineer of tests of the Pennsylvania Railroad, with office at Altoona, Pa., as has been announced in these columns, was born on May 19, 1878, at Washington, D. C., and was educated at Washington High School and at Cornell University. He began railway work in June, 1900, as a special apprentice on the Pennsylvania Lines West of Pittsburgh, Southwest system, and in March, 1903, was made assistant roundhouse foreman at Columbus, Ohio. The following August he was appointed machine shop foreman at the same place, and from January, 1904, to December, of that year, was in the testing department, as chief computer on the locomotive testing plant at the World's Fair, St. Louis, Mo. He was then appointed motive power inspector and was later superintendent of motive power, with office at Columbus, Ohio. In May, 1906, he was made assistant master mechanic at Fort Wayne, Ind., and the following October was appointed assistant engineer of motive power on the Southwest system of the Pennsylvania Lines West. Mr. Young was appointed assistant enginerr of motive power in the office of the general superintendent of motive power at Pittsburgh, Pa., in June, 1910, and now becomes engineer of tests, as above noted.

W. P. Hobson, whose appointment as superintendent of motive power of the Kentucky & Indiana general division, of the Chesapeake & Ohio, with office at Covington, Ky., has been announced in these columns, was born on June 29, 1869, in Goochland county, Va., and was educated in the public and private schools of that state. He began railway work on September 1, 1886, as a machinist apprentice in the shops of the Chesapeake & Ohio at Huntington, W. Va., and since that time has been in the continuous service of that company. Four years later he went to Hinton as a machinist, and in April, 1891, was promoted to night roundhouse foreman. Mr. Hobson was appointed general roundhouse foreman at Clifton Forge, Va., in 1901, and three months later he was made assistant master mechanic of the Huntington division at Hinton. In December, 1904, he was appointed master mechanic of the Ashland division, with office at Lexington, Ky., and in May, 1910, was transferred to the Cincinnati division, at Covington, which position he held at the time of his recent appointment as superintendent of motive power.

W. P. Hobson.

H. R. Safford, whose appointment as chief engineer of the Grand Trunk, with office at Montreal, Que., has been announced in these columns, was born at Madison, Ind., and was educated at Purdue University, Lafayette. He began railway work on July 1, 1895, with the Illinois Central in the engineering department as a rodman on second track work, and in December, of the same year, was transferred to the lake front improvements at Chicago. From 1896, to 1897 he was resident engineer, engaged in second track construction work, and then for two years was assistant engineer of general work, and the following year was assistant engineer of grade revision. Mr. Safford was roadmaster on various divisions, from March, 1900, to May, 1903, and was then appointed principal assistant engineer of the same road. In May, 1905, he was promoted to assistant chief engineer, becoming chief engineer of maintenance of way, in July, 1907. He left the service of the Illinois Central in May, 1910, to become assistant to the president of the Edgar Allen American Manganese Steel Company, and since May, 1911, he was chief engineer of the George B. Swift Company, from which position he resigned to become chief engineer of the Grand Trunk.

H. R. Safford.

Charles H. Moore, who has been appointed principal assistant engineer of the Erie Railroad, with office at New York City, as has been announced in these columns, was born on December 9, 1863, at Baltimore, Md. He graduated from Lafayette College in 1884, and also took a post graduate course. Mr. Moore began railway work in March, 1888, in the engineering department of the New York, Lake Erie and Western (now the Erie Railroad) as a rodman. In June, 1890, he was appointed resident engineer of the Northern Railroad of New Jersey, which is operated by the Erie, and the following March was made assistant engineer of the New York, Lake Erie & Western. For one year, from March, 1893, he was assistant engineer of the Quaker City & North Eastern Construction Company, Philadelphia, Pa., and was then appointed assistant engineer of the Erie Railroad, also of the New York, Susquehanna & Western, and in April, 1900, was made first assistant engineer of the Erie. In 1905, Mr. Moore, while on a furlough from the Erie Railroad, made a reconnoissance, preliminary survey and report for the government of Ecuador for a railway to connect the head of navigation on the Amazon river with the Pacific ocean. In December, 1905, he was appointed engineer of grade crossings of the Erie Railroad, which position he held at the time of his recent appointment, as above noted.

C. H. Moore.

George E. Boyd, whose appointment as superintendent of bridges and buildings of the Delaware, Lackawanna & Western, with office at Scranton, Pa., has been announecd in these columns, was born on February 26, 1874, at Roseville, Ill., and was educated in the public schools and at the University of Illinois. He began railway work on May 24, 1897, in the engineering department of the Illinois Central, since which time he has been consecutively, rodman, instrument man, resident engineer and assistant engineer, in both the construction and maintenance departments. From March, 1904, to May, 1905, he was roadmaster of the Omaha division of the Illinois Central, and was then transferred to the St. Louis division. He was again transferred in the same capacity in July, 1907, to the Illinois division, and now becomes superintendent of bridges and buildings of the Delaware, Lackawanna & Western.

Purchasing Officers.

Louis F. Beneke has been appointed stationer of the Philadelphia & Reading and subsidiary companies, with office at Spring Garden station, Philadelphia, Pa., succeeding John S. Carter, deceased.

OBITUARY.

J. H. Sayle, until a few weeks ago general agent of the Chicago Great Western, with office at Milwaukee, Wis., died on his way to Tucson, Ariz., on October 13.

Frederick S. Capron, traveling passenger agent of the Grand Trunk for 20 years following the Civil war, died at Evanston, Ill., on October 17, at the age of 84 years.

H. M. Brownlee, trainmaster of the Knoxville division of the Louisville & Nashville at Knoxville, Tenn., died on October 13 from injuries he received from the falling of a crown sheet of an engine.

A. I. Miller, purchasing agent of the Missouri, Kansas & Texas system, with office at St. Louis, Mo., died at that place on October 11. Mr. Miller was 46 years old and had been with the Missouri, Kansas & Texas 23 years.

Archer Harman, who built the Guayaquil & Quito Railroad, now operating about 300 miles of railway in Ecuador, S. A., and who was president of that company, died at Hot Springs, Va., on October 9, from injuries sustained in an accident.

Henry W. Fuller, passenger traffic manager of the Chesapeake & Ohio at Washington, D. C., died at his home, in that city, on October 13. Mr. Fuller was born at Corning, N. Y., and began railway work in 1866 as a brakeman. From February, 1866, to March, 1869, he was sleeping car conductor for the Woodruff Sleeping Car Company, and then for three years was traveling advertising agent of the Atlantic & Great Western, and the Erie Railroad, at Kansas City, Mo. In 1872 he was appointed general southern agent of the Erie at Cincinnati, Ohio, and two years later was made general southwestern agent at Indianapolis, becoming general western passenger agent in 1878. He was appointed general passenger agent of the Chesapeake & Ohio in June, 1881, and passenger traffic manager in May, 1907. Mr. Fuller had been ill for many months of a complication of diseases. He was one of the best known passenger men in the country.

The Siberian Railway does not seem as yet to be a profitable enterprise. The operating expenses were 144 per cent. of the gross earnings in 1906, 139 per cent. in 1907, and 124½ per cent. in 1908. In this last year the deficit was $6,693,000, to which must be added the interest on the capital invested, $235,292,862, to find what Russia is paying for the development of its Asiatic territory and for national defence. There is some development of earnings on that part of the line which is west of Lake Baikal, which alone the Russians call the Siberian Railway. The line east of the lake is called the Trans-Baikal, and the 570 miles on the Pacific coast from Vladivostock northeastward, the Ussuri Railway. The earnings of these last two have decreased materially since 1906; but the Siberian proper actually had some net earnings in 1908, about $488 per mile, against a deficit of $692 in 1907. There is a considerable amount of cultivable land along this line, and it is nearer the markets for its wheat, butter, etc.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The New York Central has ordered 30 Pacific type locomotives from the Baldwin Locomotive Works.

The Buffalo, Rochester & Pittsburgh is said to have ordered 7 mikado locomotives and 3 Pacific type locomotives from the American Locomotive Company. This item has not been confirmed.

The Virginia & Southwestern has ordered 1 mikado locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 27 in. x 30 in., the diameter of the driving wheels will be 63 in. and the total weight in working order will be 269,000 lbs.

Roger Miller & Son, Toronto, Can., have ordered 2 four-wheel switching locomotives from the Montreal Locomotive Works. The dimensions of the cylinders will be 11 in. x 16 in.; the diameter of the driving wheels will be 33 in., and the total weight in working order will be 39,000 lbs.

P. Lyall & Sons, Montreal, Que., have ordered one four-wheel switching locomotive from the Montreal Locomotive Works. The dimensions of the cylinders will be 13 in. x 18 in.; the diameter of the driving wheels will be 36 in.; and the total weight in working order will be 56,000 lbs.

CAR BUILDING.

The Boston & Maine has ordered 13 sixty-foot mail cars from the Laconia Car Company.

The Vredensburg Sawmill Co., Pine Hill, Ala., is in the market for 20 fifty-ton logging cars.

The Long Island has ordered 20 motor cars, 15 coaches and 5 mail cars from the American Car & Foundry Company.

The Arms Palace Horse Car Company, Chicago, has ordered three special passenger train horse cars from the Pullman Company.

The Independent High Grade Oil Company, Pittsburgh, Pa., has ordered 20 steel tank cars from the Warren Foundry Company.

The Chicago, Milwaukee & St. Paul, it is said, will build 1,400 freight cars at the company's shops. This item has not been confirmed.

The Southern is making inquiries for 500 all-steel 50-ton drop bottom gondola cars and 50 all-steel underframe 30-ton ventilated box cars.

The Akron, Canton & Youngstown, Akron, Ohio, has ordered 50 gondola cars, 35 box cars and 15 flat cars from the American Car & Foundry Company.

The American Refrigerator Transit Company, St. Louis, Mo., has ordered 600 steel underframes for reinforcing refrigerator cars from the American Car & Foundry Company.

The Pennsylvania has ordered 35 coaches and 17 combination passenger cars from the Pressed Steel Car Company, and 30 coaches from the American Car & Foundry Company. This road is now in the market for 300 tank cars.

The Board of Public Works, San Francisco, will receive bids until November 1, on 43 double truck and double end pay-as-you-enter cars and 4 extra trucks complete with axles, wheels and motors, for the Geary Street Municipal Railway. James L. McCormick is secretary of the Board of Public Works, San Francisco, Cal.

The Buffalo, Rochester & Pittsburgh, as mentioned in the *Railway Age Gazette* of October 6, has ordered 1,500 fifty-ton all-steel hopper cars, divided equally between the Pressed Steel Car Company, the Cambria Steel Company and the Standard Steel Car Company. These cars will weigh 38,000 lbs. Their inside measurements will be 30 ft. long, 9 ft. 5½ in. wide and 10 ft. high; their over-all measurements will be 31 ft. 6 in. long over striking plates, 10 ft. wide and 10 ft. 8 in. high. The special equipment will be as follows:

Axles	Open hearth steel.
Bolsters, body	Steel.
Bolsters, truck	Gould cast steel on 1,000. Pittsburgh Equipment Co. cast steel on 500 (Pressed Steel Car Co.).
Brakes	New York on 1,000. Westinghouse on 500 (Cambria Steel Co.).
Brake beams	Waycott on 1,000. Buffalo on 500 (Standard Steel Car Co.).
Brake shoes	Steel backed.
Brasses	Lawrenceville bronze.
Couplers	Gould.
Draft gear	Miner friction on 500 (Standard Steel Car Co.). Sessions' on 500 (Pressed Steel Car Co.). Farlow spring on 500 (Cambria Steel Co.).
Dust guards	Bass wood.
Journal boxes	Symington.
Paint	B. R. & P. standard black paint.
Side bearings	Plain friction.
Springs	M. C. B.
Trucks	Andrews' truck frames.
Wheels	Cast iron.

IRON AND STEEL.

The Canadian Pacific is in the market for 50,000 tons of rails.

The Baltimore & Ohio has ordered 700 tons of bridge steel from the Mt. Vernon Bridge Company.

The Delaware & Hudson has ordered 500 tons of Bessemer rails from the Maryland Steel Company.

The Central of Georgia has ordered 30,000 tons of 90-lb. rails from the Tennessee Coal, Iron & Railroad Company.

The Pennsylvania has ordered 560 tons of bridge steel for the bridge over the Schuylkill river from the Pennsylvania Steel Company.

The Central of New Jersey has ordered 5,000 tons of bridge steel for two bridges over the Hackensack and Passaic rivers from the American Bridge Company.

The Wabash has ordered 752 tons of bridge steel from the American Bridge Company for a bridge over the Illinois river, and 132 tons of structural steel for the new reinforced concrete freight house and office building at Ft. Wayne, Ind., from the Illinois Steel Company.

General Conditions in Steel.—Although the volume of business in the steel industry is 10 per cent. greater than the average in the three big years of 1905, 1906 and 1907, the conditions are not good, the productive capacity exceeding the demand and there being no price agreement. New business is being booked which, were it not for the present low prices, would not have been received until after the first of the year. If the prices are not raised soon the buyers will be well stocked up and business will be at a very low ebb when they are finally increased to normal.

FOREIGN RAILWAY NOTES.

The Suez canal tolls will be reduced on January 1, 1912, to $1.30 a ton for freighted ships and $.82 for ships in ballast. This is a reduction of 9.65 cents a ton.

Bolivia now has 635 miles of railways in operation. Of this total, 487 miles represent the length of the older railways, while the balance is being operated provisionally by the contractors on new lines now being constructed.

A petition has been placed before the Argentine national senate for a concession to construct and operate for a period of 60 years, cable railways in various parts of the Argentine Republic. The application also covers the generation and supply of electric power.

A decree of the president of Paraguay, dated May 26, 1911, declares null and void the concession granted on June 1, 1909, for the construction of a railway from Asuncion to the mouth of the Iguazu river, and orders the forfeiture of the deposit of $10,000. Failure on the part of the consessionaire to fulfill the conditions imposed on him by the contract is given as the reason for the annulment.

Supply Trade News.

Albert H. Wiggin, president of the Chase National Bank, New York, has been made a director of the American Locomotive Company, New York, succeeding Julius E. French, deceased.

The Warner Equipment Company, Cincinnati, Ohio, has purchased the plant of the Cincinnati Equipment Company at that city, where it will make and repair steam shovels, dump cars, locomotives and contractors' machinery.

George T. Cooke, formerly mechanical inspector of the Pullman Company, Chicago, has been made southern representative of the Chicago Car Heating Company, Chicago, with office at Atlanta, Ga., succeeding A. G. DeLang, resigned.

The Roberts & Schaefer Company, Chicago, has received a contract from the Central New England for designing and constructing a 600-ton locomotive coaling station at Maybrook, N. Y. The approximate contract price will be $13,000.

George W. Greene, manager of the American Bureau of Inspection & Tests, Chicago, with office at Pittsburgh, Pa., has resigned to become mechanical engineer of the Hildreth-Jones Company, Chicago, and Hildreth & Company, New York.

The American Locomotive Company, New York, has received an order from the Western Pacific for one rotary snow plow of the scoop-wheel type, with 18 in. x 26 in. cylinders, and an order from the Chickamauga Quarry Construction Company, Chattanooga, Tenn., for one steam shovel.

In our Court News columns is a short account of the decree of the United States district court dissolving the National Electric Lamp Company, Cleveland, Ohio, which company, having control of the sale of incandescent lamps for the General Electric Company, Schenectady, N. Y., was found to be in unlawful restraint of trade under the Sherman anti-trust law.

C. F. McCuen, manager of the railway department of the International Correspondence Schools, Scranton, Pa., has resigned this position to become western manager of the Ward Equipment Company, New York, with office in Chicago. Mr. McCuen was in the mechanical departments of the Missouri Pacific and the St. Louis Southwestern for 12 years.

The Railway Steel-Spring Company, New York, has issued $3,500,000 (the amount authorized) first mortgage 5 per cent. gold bonds, secured on the real estate and plant acquired from the Inter-Ocean Steel Company, Chicago. These bonds will mature October 1, 1931. They are being offered at 97 and accrued interest by the Continental & Commercial Trust & Savings Bank, Chicago, by Harvey Fisk & Sons, New York; and by Jackson & Curtis, Boston.

The September sales of the Western Electric Company, Chicago, show a gain of 12 per cent. over August, and are the largest September sales in the history of the company. For the nine months to September 30 the gross earnings were 4 per cent. more than for the corresponding period of last year, and it is estimated that the gross earnings for the full year will be $66,000,000. On January 1 the company expects to occupy an additional 200,000 sq. ft. of floor space at its Hawthorne plant, including a new general merchandise building.

Gano Dunn, for many years first vice-president and chief engineer of the Crocker-Wheeler Company, Ampere, N. J., and a former president of the New York Electrical Society, has been made a director and a vice-president of J. G. White & Company, Inc., New York. Mr. Dunn has just returned from abroad, where, as a representative of the United States government, and as president of the American Institute of Electrical Engineers, he has been attending the International Electrical congress at Turin, Italy, and the meeting of the International Electro-Technical commission, which was organized to bring about international uniformity of standards and practice in the electrical industry.

The National Railway Appliances Association, Chicago, is now making preparations for the annual exhibition of railway appliances used in the construction and maintenance of steam and electric railways, which will be made at the Coliseum and First Regiment armory, Chicago, March 18-23, 1912, when the American Railway Engineering Association and the Railway Signal Association hold their meetings. The Railway Appliances Association has been incorporated under the name of the National Railway Appliances Association. The arrangement of the main floor space in the Coliseum will be almost the same as last year, but the balconies will not be used. In order to provide for the increasing demand for space, the First Regiment armory, adjoining the Coliseum, has been leased, which will give an additional 16,000 sq. ft. of floor space. The price of the floor space will be $0.45 per sq. ft., the additional charge of five cents per sq. ft. over last year, having been made because of the necessity of buying fixtures this year, instead of renting them as heretofore. The first allotment of space will be made on or about November 1, by the executive committee of the association. Therefore it is advisable to have all applications for space in the hands of the secretary, Bruce V. Crandall, 537 South Dearborn street, Chicago, before that date.

TRADE PUBLICATIONS.

Crayons.—The Zelnicker Crayon Works, St. Louis, Mo., has published a small illustrated folder on its crayons for marking cars, etc.

St. Louis Southwestern.—The passenger department of this company has published and is distributing a very attractive steel engraving, 23 in. x 50 in. of the double track bridge across the Mississippi river at Thebes, Ill.

Locomotive Cranes.—The Brown Hoisting Machinery Company, Cleveland, Ohio, has published a 55-page fully illustrated booklet entitled Brownhoist, showing a number of typical installations of cranes. Little attempt is made to describe them in detail.

Pumps.—The De Laval Steam Turbine Company, Trenton, N. J., has published a reprint of the report by Francis Head on the test made at the Torresdale filter plant on the Delaware river. The tests were made on six of the engine-driven pumps and the turbine-driven pump and extended over one years' time.

Electrical Equipment.—The General Electric Company, Schenectady, N. Y., has published in bulletin No. 4834 an article on the Electrical Equipment of the Detroit River Tunnel, reprinted from the *Electric Railway Journal* of January 14 and 21. The subject is treated in detail. The bulletin contains illustrations of exterior and interiors of converter and transformer sub-stations; it shows various methods of construction and insulation, as well as the size of locomotives and the location of the apparatus; also the construction and size of the tunnels and sub-station wiring.

Batteries.—Thomas A. Edison, Incorporated, Orange, N. J., has published a reprint of an argument comparing the relative economy of primary batteries and lead type portable storage batteries for railway signal operation. This article was prepared by E. E. Hudson, of the Edison Manufacturing Company, Orange, and read at the meeting of the Railway Signal Association, held in Chicago on March 20, 1911, with extracts from discussions and other additions in reply to a paper prepared by A. H. McKeen, signal engineer of the Oregon-Washington Railroad & Navigation Company, entitled Portable Storage Batteries as Applied to Automatic Signals on the Harriman Lines. Both of these papers were published in the daily edition of the *Railway Age Gazette* for March 21, 1911.

FOREIGN RAILWAY NOTES.

The Chilean press has opened a campaign against the service of the Transandine Railway. The line belongs to and is operated by two independent companies, one of which receives a subvention from the Chilean government. A leading Chilean paper advocates unification and amalgamation of the now divided service and responsibility.

The survey now being carried on by engineers of the Central Railroad, Dominican Republic, for the deviation of the rack railway from San Marcos to Barrabas, is progressing rapidly. Upon the completion of the survey the construction of the line will be begun. This railway will establish a more rapid and comfortable connection between Santiago and Puerto Plata.

Railway Construction.

New Incorporations, Surveys, Etc.

Baltimore & Ohio.—This company has completed the work of changing the narrow gage line to standard gage, from Foxburg, Pa., via Kane to Mt. Jewett, 94 miles. Many sidings and industrial spur tracks were widened at the same time. The improvements included widening the cuts, strengthening the bridges and tressels, lengthening culverts and drains, moving section platforms, water tanks, coal and limestone tipples. The line has been laid with 85-lb. rail.

British Columbia (Electric).—An officer writes that a contract has been given to Moore & Petrick, and work is now under way, building from Victoria, B. C., north through the Saanich Peninsula to a point not yet decided upon, about 20 miles. The work will be fairly heavy, and maximum grade will be 2.5 per cent. A. T. Goward, manager, and G. M. Tripp, superintendent, Victoria, B. C. (October 6, p. 690.)

Canadian Roads.—Plans are being made to build a line from Gibson, N. B., to Minto, 33 miles, to provide a connection between the Canadian Pacific and the Grand Lake coal fields, as well as an outlet to the west for the coal. Sir Thomas Tait, Minto, N. B., is back of the project.

Canadian Northern Ontario.—The Gowganda sub-division has been extended from Gowganda Junction, Ont., to Ruel, 13 miles. A. F. Stewart, chief engineer, Toronto, Ont.

The first section of the Toronto-Montreal line, 110 miles, has been open for traffic between Toronto, Ont., and Trenton.

Canadian Pacific.—The Irricana sub-division of the Alberta division, has been opened for business from Irricana, Alberta, to Standard, 36.5 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Chicago, Milwaukee & St. Paul.—The report of this company for the year ended June 30, 1911, shows that additional second main track has been completed on the La Crosse division from Camp Douglas, Wis., to West Salem, about 39 miles, except on a gap of about three miles west of Tunnel City; on the River division from Wabasha, Minn., to Minneiska, about 17 miles; from Richmond to Whitman, about 25 miles, and on the Prairie du Chien division from Elm Grove, Wis., to Blue Mound Junction, about 7 miles. During the year 72 steel bridges, aggregating 8,181 ft. in length, and 85 masonry bridges, aggregating 6,428 ft, in length, were built, replacing 9,433 ft. of wooden bridges, 4,811 ft. of iron bridges, and 365 ft. of embankment, and 662 wooden culverts were replaced with iron. About 2.2 miles of pile bridges were filled with earth, 76 bridges having been completely filled and 88 reduced in length by filling.

Clear Lake.—This company has plans made, it is said, to build extensions from Hopeland, Cal., east four miles, and south and west from Lakeport, five miles. C. M. Hammond, president, Upper Lake. (July 14, p. 104.)

Durham & South Carolina.—An officer writes that a contract has been given to John McKenney, Lynchburgh, Va., and grading work will be started at once on an extension of this line. The company expects to carry lumber, logs, wood, fertilizer and general merchandise, as well as secure through connections with the Raleigh & Southport and the Atlantic Coast Line. A. L. Cornell, chief engineer, Durham, N. C. (September 16, p. 1167.)

Fresno, Coaling & Tidewater (Electric).—An officer writes that this company and the Fresno Coalinga & Monterey, expects to let contracts very soon to build from Fresno, Cal., via Hollister and Salinas to Monterey. The work includes building a 1,400-ft., and an 800-ft. steel bridge, and there will be an 800-ft. tunnel. Some station buildings are also to be put up. The line is being built to carry grain, hay, oil, fruits, wine and oil-well supplies. A. Albrecht, secretary, and J. S. Bates, chief engineer, Fresno, Cal. (June 30, p. 1714.)

Fresno, Coalinga & Monterey.—See Fresno, Coalinga & Tidewater.

Grand Trunk.—See Southern New England.

Grand Trunk Pacific.—Regarding the progress of work on this line, President C. M. Hays recently made the following statement: "During the last fiscal year track-laying on the main line of the Western division had been extended from Wolf Creek, Alb., to Fitzhugh, west of the Athabaska river, in the Rocky mountains, which is 1,027 miles west of Winnipeg, Man., and will be made the divisional point for that section. Construction work is under full headway, with night and day forces, to Tete Jaune Cache, B. C., on the Fraser river beyond Yellowhead Pass, on the western slope of the Rocky mountains, and it is expected that track-laying will reach this point, which is 1,094 miles west of Winnipeg, before the close of the year. In the western provinces the company has under construction at the present time approximately 1,400 miles of branch lines, considerable portions of which have already been completed, the latter includes the lines to Yorkton, Sask., Canora, Regina and Moose Jaw. Lines are also under construction to Prince Albert, Battleford, Calgary, Alb., and Lethbridge, which will place all these cities in direct communication with the main line. Branch lines are also being built into the rich coal fields west of Edmonton. On all sections of the line which have been sufficiently completed trains are at present in operation. Throughout the country to be traversed by the company's lines it is proposed to construct a number of first-class modern hotels, a contract has been let for the construction of a large hotel in the city of Winnipeg at a cost of $1,300,000. Good progress has been made in the construction work on the Eastern division, and the present condition of that work shows a total of 1,223.45 miles of main line track and 136.50 miles of side track laid, and the remaining portions of this section are all under contract. Of the total 5,133 miles of railway, there has been laid at the present time, about 3,300 miles of main line track, and on some large sections on which the construction of the roadbed is already far advanced, a large addition will be made to the mileage within the next few months." B. B. Kelliher, chief engineer, Winnipeg, Man. (October 6, p. 690.)

Houston & Texas Central.—According to press reports, surveys have been made for the cut-off from Giddings, Texas, northeast via Caldwell, to Stone City, about 50 miles, and it is understood that construction work will be started soon. I. A. Cottingham, engineer m. w. and structures, Houston, Tex. (August 25, p. 391.)

Hudson & Manhattan.—The New York Public Service Commission, First district, has extended the time to April 28, 1912, for the completion of the extension from Thirty-third street, New York City, in the borough of Manhattan, to Grand Central station. J. V. Davies, chief engineer, 30 Church street, New York.

Intercolonial Railway.—A contract has been let, it is said, to M. P. Davis, to build the branch from Dartmouth, N. S., to Deans. A contract has also been let to the Nova Scotia Construction Company to build the Guysboro Country Harbor line from Guysboro to Country Harbor cross-roads, thence to deepwater at Country Harbor. W. B. MacKenzie, chief engineer, Moncton, N. B. (August 25, p. 391.)

Kansas City, Mexico & Orient.—A new extension was put in operation last month from San Angelo, Tex., to Barnhart, 55 miles. The line is now being extended west of Barnhart and work is expected to be finished to Fort Stockton, 164 miles from San Angelo, by January, 1912, and to Alpine, 65 miles additional, by April, 1912. W. W. Colpitts, chief engineer, Kansas City, Mo.

Louisville & Nashville.—The Washiota & Black Mountain has been extended from Baxter, Ky., south to Benham, 24 miles, and a line is now in operation between Pineville and Nield, 5.4 miles. W. H. Courtenay, chief engineer, Louisville, Ky.

Maine Central.—This company is now laying new rail on the line between Lewiston, Me., and Waterville. The company is also relocating about five miles of line near Bingham, to secure easier curves and grades. T. L. Dunn, chief engineer, Portland, Me.

Missouri, Oklahoma & Gulf.—The Bromide branch has been opened for business from Bromide Junction, Okla., to Bromide, 4 miles. J. J. Harrison, chief engineer, Muskogee, Okla.

Nashville, Lafayette & Eastern.—An officer writes that this company, which was recently incorporated in Tennessee, proposes to build from Westmoreland, Tenn., on the Louisville & Nashville, to Lafayette, and to Burnside, Ky., about 100 miles, where connection is to be made with the Queen & Crescent.

W. H. Whorley, chief engineer, Nashville, Tenn. (September 15, p. 544.)

Natchez, Columbia & Mobile.—An officer writes that this company, which operates a line from Norfield, Miss., to Log Switch, 20 miles, is building an extension southeast towards Morgantown. R. B. Butterfield, general manager, Norfield, Miss. (February 17, p. 334.)

Nevada-California-Oregon.—An officer writes that contracts had been given to Maney Bros. & Co., and Gibson & Tedford, for building an extension from a point north of Alturas, Cal., north via Willow Ranch, to Lake View, Ore., and work is now under way. (April 28, p. 1016.) G. S. Oliver, chief engineer, Reno, Nex.

Northern Illinois (Electric).—An officer writes that a contract has been given to Burns & Co., Chicago, and work is now under way building from Amboy, Ill., northeast to Rochelle. The company now operates about 10 miles of line. J. J. Burns, manager and engineer, 705 Isabella building, Chicago. (February 17, p. 334.)

North Louisiana & Gulf.—The line between Danville, La., on the Hodge division, and Walsh on the Bienville division, has been completed, and the entire line from Hodge to Bienville, 25.7 miles, has been opened for traffic. J. S. Hunt, general manager, Bienville, La.

Northern Pacific.—Work is to be started at once, it is said, to complete the extension of the Missouri River Railway (Mandan Northern Line) north to Hensler, N. D., 43 miles from Mandan. W. L. Darling, chief engineer, St. Paul, Minn.

North Yakima & Valley.—This company is said to have started construction work on an extension into the Cowiche district, Wash., about 12 miles. George Donald, president, North Yakima, Wash.

Pennsylvania Northern.—Incorporated in Pennsylvania, with $500,000 capital, to build a 50-mile line between Clarion, Pa., and Hallton, about 30 miles. H. Buckingham, president, Clarion. C. Miller, Franklin, is also interested in the project.

Portland & Southeastern.—According to press reports, arrangements have been made to start work on an extension from the present southern terminus at Albritton, Ark., south to Lake Providence, La., thence southwest to the Vicksburg, Shreveport & Pacific, in the northern part of Madison parish, about 50 miles. Charles P. Conger, general manager, St. Louis, Mo. (February 3, p. 258.)

Quebec Railway Light & Power Co.—Trains are now in operation from Beauport Junction, Que. (formerly Beauport), which is 2.8 miles from Quebec to Kent House, 3.5 miles. C. E. A. Carr, general manager, Quebec, Que.

Sacramento Short Line (Electric).—It is said that work is to be started soon on the lines projected from Oakland, Cal., northeast to Sacramento and to other points in the Sacramento valley, by this company and the San Jose Short Line, which was recently incorporated in California. Some of the incorporators are identified with the United Properties Company, and include B. M. Aikens, R. P. Henshaw, D. W. Mordecai and F. L. Stewart. (February 3, p. 258.)

Southern Pacific.—An officer writes that the Willamette Pacific, which is an auxiliary corporation of the Southern Pacific, will build a line from Eugene, Ore., via Suislaw river west to the Pacific ocean, thence south to Marshfield, 123 miles. Engineers are now locating the line, and it is expected that construction work will be started as soon as the right-of-way is secured and contracts are let. The company expects to find a traffic in timber, farming and dairy products. C. R. Breck is chief engineer of the Willamette Pacific, Eugene, Ore. (August 18, p. 357.)

Stephenville, North & South Texas.—This line has been open for traffic from Hamilton, Tex., west of Comanche. W. T. Eaton, chief engineer, Tyler, Tex.

St. Louis, San Francisco & Texas.—According to press reports, this company is now making surveys for an extension from Brady, Tex., south via Fredericksburg, to San Antonio, and it is understood that construction work will be started in the near future. W. B. Drake, vice-president, Ft. Worth, Tex.

Sumter & Choctaw.—This road has been extended from Edna, Ala., to Choctaw City, 7 miles. E. F. Allison, president and general manager, Bellamy, Ala.

Temiskaming & Northern Ontario.—A new branch has been opened for business from Iroquois Falls, Ont., to South Porcupine, 27 miles. S. B. Clement, chief engineer, North Bay, Ont., Canada.

Tennessee & Tombigbee.—An officer writes that surveys are now being made for a line from Red Bay, Ala., on the Illinois Central, east via Belgreen, Rockwood, Newberg, Mt. Hope and Moulton to Decatur, 74.48 miles. There will be three 60-ft. bridges and one trestle about 600-ft. long, also several smaller structures. The line expects to find a traffic in iron ore, stone, timber and farming products. Contracts for the work have not yet been let. A. J. Hackett, president, and W. R. Coleman, chief engineer, Red Bay, Ala.

Texas & Pacific.—An officer writes that this company is now relaying certain sections of the line with 6,000 tons of 75-lb. rail. C. S. Chamberlain, chief engineer, Dallas, Tex.

Southern New England.—This company, which was organized by the Grand Trunk to build from the Central Vermont through Palmer, Mass., to Providence, R. I., has petitioned the Massachusetts Railroad Commission for authority to issue $1,000,000 of stock. The estimated cost of the line is $3,711,632. $1,000,000 was paid in at the time the articles of association were signed. It is now desired to formally organize the company. Already some $50,000 has been spent. The proceeds of the stock will be used mainly for securing right of way, construction and equipment.

Tombigbee Valley.—This road has been extended from Souwilpa, Ala., to Toxey, 7.5 miles. William Toxey, chief engineer, York, Ala.

Union Pacific.—This company has just opened for traffic an additional section of double-track, it is said, and the company now has double-track all the way from Omaha, Neb., to Julesburg, Colo., 372 miles. There is over 600 miles of double-track between Omaha, Neb., and Ogden, Utah, and the remaining 400 miles between those two points will be double-tracked within the next three years. R. L. Huntley, chief engineer, Omaha, Neb. (May 5, p. 1085.)

United Properties Company.—See Sacramento Short Line.

Willamette Pacific.—See Southern Pacific.

RAILWAY STRUCTURES.

Aberdeen, Wash.—The Oregon-Washington Railroad & Navigation Company has given a contract to Alexander Pearson, Seattle, for putting up a freight terminal in Aberdeen, Wash., to cost $15,000. (September 29, p. 616.)

Calgary-Alberta.—According to press reports this company is planning to put up shops at Calgary, to cost $1,500,000.

Calumet, Ind.—The Cudahy Packing Company, South Omaha, Neb., is building a plant at Calumet, Ind., for constructing, repairing and rebuilding its own refrigerator cars and tank cars, to replace the main plant at South Omaha, Neb., which was recently burned.

Charleston, Ill.—The Chicago & Alton is taking bids on a one-story brick passenger station to replace the structure recently destroyed by fire.

Clarksburg, W. Va.—According to press reports, the Baltimore & Ohio has decided to make improvements at a cost of $1,000,000 during the next two years at Clarksburg. The work includes putting up a new freight station, which is to be finished by next spring, at a cost of $150,000, and building sheds at once to cost an additional $150,000 at the passenger station.

Cordova, Alaska.—The Copper River & Northwestern has started work on car and machine shops in Cordova.

Fairbury, Neb.—The Chicago, Rock Island & Pacific is planning to remodel its freight yard and to build a new passenger station to replace the one burned last summer.

Flushing, N. Y.—The Long Island Railroad recently gave a contract to F. H. Clements & Co., Philadelphia, Pa., for eliminating nine grade crossings in Flushing, over the following thoroughfares: Lawrence street, Main street, Parsons avenue, Percy street, Wilson avenue, Boerum avenue, Murray street and Broadway. It is estimated that the work will cost about $400,000.

Fresno, Cal.—See Fresno, Coalinga & Tidewater.

Galveston, Tex.—The Gulf, Colorado & Santa Fe has completed plans for a steel and concrete passenger station and office building. The structure will be 100 ft. x 125 ft. at the base and eight stories high, and will cost approximately $500,000. It is expected that all contracts will have been let and construction commence by January 1, 1912.

Houston, Tex.—According to press reports, the International & Great Northern is planning to make improvements to its freight terminals at Franklin and Jacinto streets in Houston.

Maybrook, N. Y.—A contract has been given by the Central New England to the Roberts & Schafer Co., engineers and contractors, Chicago, for the design and construction of a 600-ton locomotive coaling station, to be built at Maybrook, N. Y., at a cost of $13,000.

Meridian, Cal.—The Northern Electric and Colusa and Sutter counties will jointly build a bridge, it is said, over the Sacramento river at Meridian. The estimated cost of the improvement is $241,000.

Philadelphia, Pa.—An officer of the Pennsylvania Railroad, writes regarding the reports that work is to be started at once on a large elevator to be built at Philadelphia, Pa., that plans have not yet been prepared for this structure.

Richmond, Cal.—Announcement has been made that the Atchison, Topeka & Santa Fe will construct a pier 1,000-ft. long and 150-ft. wide at Richmond. The pier will have four tracks.

Riverhead, N. Y.—During the past year the Long Island Railroad has put up new stations at Riverhead, Greenlawn, Hillside, Merillon avenue and Forest Hills. These buildings cost in the neighborhood of $75,000. With the exception of Forest Hills station, all the buildings were put up by the company's construction department. Work is now under way on a new station at Bayshore.

Rossville, Ill.—The Elgin, Joliet & Eastern is planning to build a new and larger roundhouse to replace the present 5-stall structure.

San Bernardino, Cal.—The Atchison, Topeka & Santa Fe will build a concrete retaining wall, it is said, at the bridge over the Mojave river, to cost $10,000.

Slater, Mo.—The Chicago & Alton has let a contract for building an addition to its roundhouse, an addition to its powerhouse, a new machine shop and a 90-ft. turntable. The total cost of the improvements is $25,000.

Vallejo, Cal.—The Vallejo & Northern is planning to put up terminal buildings, it is said, in Vallejo, Cal.

FOREIGN RAILWAY NOTES.

Construction work on the Potosi Railway, Bolivia, is being rapidly pushed. On June 10, 1911, rails had been laid as far as kilometer 79. This line will traverse the highest region of Bolivia.

Work on the Uyuni-Tupiza Railway, in Bolivia, was formally inaugurated June 8, 1911. It is proposed to also build a branch that will connect this line with the railway from Quiaca to Buenos Aires, Argentina.

The Southern San Paulo Railway Company, an English corporation, has recently been registered in Brazil. The purpose of the company is to obtain from the government of the state of Sao Paulo, Brazil, a concession for the construction, equipment and operation of a railway in that state, connecting Santo Antonio do Juquia with Santos. The company also proposes to purchase or lease other lines and tramways with the object of operating them in connection with this line. The company is capitalized at $4,000,000.

Railway Financial News.

Chicago & Milwaukee.—It is understood that a committee of the Chicago & Milwaukee bondholders will buy the property at foreclosure sale, which will probably take place late in October. This will complete the reorganization which has been in progress for four yeras.

Denver, Northwestern & Pacific.—Stockholders have authorized an increase in the capital stock from $20,000,000 to $40,000,000, half of which is to be preferred and half common. Issues of $40,000,000 first mortgage 5 per cent. bonds and $8,000,000 6 per cent. income bonds have also been authorized. Holders of the present outstanding 4 per cent. bonds will be offered in exchange for each $1,000 bond, $500 in the new 5s and $500 in the 6 per cent. incomes. President W. G. Evans says: "We are not able to tell our stockholders that the extensions of the road have been financed, but under existing conditions there is not a doubt that this will be accomplished."

Denver & Rio Grande.—E. D. Adams, of the Deutsche Bank, of Berlin, Germany, has been elected a director to fill one of the vacancies created when the directors voted to increase the number of the board from nine to eleven. No permanent selection has yet been made to fill the other vacancy.

Detroit, Toledo & Ironton.—The special master appointed by the circuit court has issued a notice to all creditors of the Detroit, Toledo & Ironton that their claims must be filed before November 20.

Ferdinand Railway.—This road, which runs from Ferdinand, Ind., to Huntingburg, seven miles, has been sold under foreclosure proceedings for $20,000. The new company which is to take over operation of the road is the Ferdinand Railroad.

Grand Trunk.—See an item in regard to the organization of the Southern New England in Railway Construction news.

Illinois Central.—President C. H. Markham has been elected a director succeeding ex-President Harahan.

International & Great Northern.—The Texas Railroad Commission has finally formally approved an issue of $13,750,000 International & Great Northern refunding 5 per cent. bonds. These bonds are deposited to secure $11,000,000 3-year 5 per cent. notes. The Texas commission places a valuation on the International & Great Northern of $30,365,047.

Long Island.—The New York Public Service Commission, Second district (state) has authorized the Long Island Railroad to issue $4,000,000 10-year 4 per cent. bonds to be given to the Pennsylvania Railroad in payment of advances made by that company to the Long Island for new lines, equipment and acquisition of real estate.

Memphis Union Station.—Potter, Choate & Prentice, New York, have bought $2,100,000 2-year 5 per cent. notes, secured by $2,500,000 Memphis Union Station first mortgage 50-year 4 per cent. bonds. Both the notes and the bonds are guaranteed by the Louisville & Nashville, Nashville, Chattanooga & St. Louis, St. Louis, Iron Mountain & Southern; Southern Railway and the St. Louis Southwestern. From the proceeds of the sale of the bonds the railway company is to retire $1,500,000 2-year notes, which mature November 1, and to provide money for the completion of the property.

Portland Terminal Company.—This company, which is controlled by the Boston & Maine, has asked permission from the Maine railway commission to issue $10,000,000 bonds to pay for terminal property and to make betterments.

New Orleans, Mobile & Chicago.—B. F. Yoakum, chairman of the St. Louis & San Francisco, is quoted from Mobile as confirming the rumor of the acquisition by Frisco of a controlling interest in the New Orleans, Mobile & Chicago. Mr. Yoakum says that the Frisco does not own all of the stock of the new road, but has increased its holdings sufficiently to give it control. The Mobile line will be operated independently.

Wabash.—Howard Gould has been elected a director, succeeding J. T. Terry, resigned.

Wisconsin Central.—W. F. Fitch, of Marquette, Mich., has been elected a director, succeeding Newman Erb, of New York, resigned.

ANNUAL REPORTS

FOURTEENTH ANNUAL REPORT OF THE CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY COMPANY.

CHICAGO, September 20, 1911.

To the Stockholders of the Chicago, Indianapolis and Louisville Railway Company:

The Board of Directors submit the following report of the affairs of the Company for the fiscal year ended June 30, 1911:

INCOME STATEMENT.

	1911.	1910.	Increase. or Decrease.	
Miles of Road Operated....	616.63	615.75	Inc.	0.88
Gross Operating Revenues..	$6,186,878.62	$6,020,241.92	Inc.	$166,636.70
Total Operating Expenses..	4,257,162.67	3,948,135.34	Inc.	309,027.33
Net Operating Revenue....	$1,929,715.95	$2,072,106.58	Dec.	$142,390.63
Taxes	268,445.08	268,653.94	Dec.	208.86
Operating Income	$1,661,270.87	$1,803,452.64	Dec.	$142,181.77
Other Income	204,307.95	237,954.88	Dec.	33,646.93
Total Gross Income.....	$1,865,578.82	$2,041,407.52	Dec.	$175,828.70
Deductions from Total Gross Income, for fixed charges, including interest on funded debt	1,152,991.75	1,179,827.11	Dec.	26,835.36
Balance of Income over Charges, carried to credit of profit and loss.....	$712,587.07	$861,580.41	Dec.	$148,993.34

DIVIDENDS.

During the year the regular dividends were declared, paid and charged to Profit and Loss, as follows:

Preferred stock dividends Nos. 22 and 23, each two per cent., making four per cent. for the year.....$200,000.00

Common stock dividends Nos. 18 and 19, each one and five-eighths per cent., making three and one-quarter per cent. for the year 341,250.00

A statement of the accounts of the Company in the usual detail will be found in the tables hereto annexed.

The accounts have been examined by The Audit Company of New York, and their certificate is made a part of this report.

FUNDED DEBT.

On August 1, 1911, there matured and were redeemed by this Company the $2,300,000 of 6 per cent. bonds of the Louisville, New Albany and Chicago Railway Company, which were secured by a first mortgage upon the main line from the Illinois State line (Hammond, Ind.) to Indianapolis. The funds for this redemption were derived from the sale, prior to the close of the fiscal year, of a like amount of the Refunding Mortgage 4% bonds, Series C, of this Company, which had been reserved for that purpose. The discount on the Series C bonds so sold, as well as the balance of discount on the Series C bonds sold a year ago to refund the $3,000,000 Louisville, New Albany and Chicago Main Line 6s of 1910, was charged during the year to Profit and Loss. This last refunding operation will result in a further reduction of the current fixed charges in the amount of $54,000 per annum, and leaves the Refunding Mortgage a first and closed mortgage upon all the main lines of this Company; but of the entire outstanding issue of $15,000,000 of Refunding Mortgage bonds there are still held free in the Treasury of the Company $1,558,000 of the 5% series.

On March 15, 1911, there were created and issued $425,000 Equipment Four and one-half Per Cent. Gold bonds, Series A, payable in twenty substantially equal semi-annual installments to and including March 15, 1921. These bonds were delivered in part payment for certain necessary new equipment, viz.: 10 locomotives, 300 freight train cars, and 8 passenger train cars, constructed at a total cost of $525,241.64, the remainder of the cost, above the proceeds of the bonds, being paid in advance by the Company.

OPERATING CONDITIONS.

The operating revenues for the year were the largest in the history of the Company: but it is a fair illustration of the changing operating conditions of an American railway that six years ago, when the operating revenues for the year ended June 30, 1905, were 9.33% less than they are this year, the operating income was 19.17% greater than it is this year. The change is due to an increase of the basis of nearly every unit of operating expense.

While operating revenues increased this year 2.77%, as compared with the previous year, operating expenses increased 7.83%, divided as follows: Transportation 11.11%, Maintenance of Way and Structures 0.76%, Maintenance of Equipment 6.80%, Traffic Expenses 14.76%, General Expenses 0.97%.

As the property has been well maintained and much study has been given to operating efficiency, these increases in expenses can be traced largely to increased wages and compliance with the requirements of governmental regulating authority; though it is fair to point out that the increased terminal expenses at Louisville, incident to the congestion and reconstruction of the property of the Kentucky and Indiana Terminal Railroad Company, which is used by this Company, was a substantial, but fortunately believed to be an extraordinary, factor in increasing the operating expenses of this Company this year.

The new power acquired at the close of the year was of heavy modern type, and it is believed that it will afford an opportunity, heretofore lacking on these lines, to increase train tonnage, and so offset in some measure the increased bases of transportation expenses.

Attention is invited to Table 11 (page 23) for statistics of comparable units of the operating results.

TRAFFIC.

The revenue from passenger traffic increased 8.80%. This gratifying result is due to the particular attention which has been given to the development of this service, which, while conducted under highly competitive conditions, it is believed can be made of still greater relative importance.

While the freight revenue shows a small decrease (0.02%), as compared with the previous year, this may be accounted for by the general hesitation in business prevailing throughout the year. Particular attention is invited to the increasing diversification of the freight traffic due to the increased percentage of manufactures handled, as shown by the statement of classified tonnage in Table 14 (page 26). While this is of advantage on the revenue side, it may be pointed out that the prevailing competitive necessity of expediting the higher classes of traffic and the greater use of foreign cars which it entails, have their effect in keeping down train tonnage and swelling the cost of hire of equipment.

A traffic agreement has been entered into during the year with the Monon Coal Company, which has acquired important coal mines, adjacent to the lines of this Company, in Sullivan, Greene and Vigo Counties, Indiana. This will result in a substantial increase in the coal traffic of this Company for the future.

PHYSICAL CONDITION.

The physical condition of the property is good and has been improved during the year. The continuing policy of the Board has been one of improvement; Additions and Betterments have been charged with $1,152,122.59 through income since June 30, 1907, which is equivalent to more than two and one-half per cent. per annum on the common stock during the past four years. In the year ended June 30, 1911, such charges through income amounted to $274,302.30, the remainder of the total charge during the year of $663,559.50 to Additions and Betterments, shown in the detail statement Table 6 (page 16) to which attention is invited, being for new equipment, the cost of which was financed through the Equipment Trust, Series A.

Supplementing the permanent improvements so made as Additions and Betterments, liberal appropriations have been made for up-keep during the year, as is reflected in the charges to operating expenses of $1,383.30 per mile of road for Maintenance of Way, and $2,723.26 per locomotive, $49.21 per freight car, and $749.54 per passenger car for Maintenance of Equipment.

4,957.94 tons of new seventy-five pound steel rail were laid in the main track, 327,148 new ties were placed in the main track and branches, and 47,436 yards of new ballast were distributed and put in track. The new rail bought during the year, to be laid during the year ending June 30, 1912, was of ninety-pound section, which hereafter will be the standard of this Company.

Four steel bridges, aggregating ten spans, were erected on the French Lick Branch, replacing wooden Howe Truss spans. Nine stone box culverts and twenty-four iron pipe culverts were installed to replace less permanent structures.

There was a net increase during the year of 10.77 miles in industrial tracks, sidings and yard extensions.

The rolling stock equipment has been increased during the year by the addition of twelve new consolidation freight engines, three new Pacific type passenger engines, one hundred 80,000 pound capacity steel underframe automobile box cars, and two hundred 80,000 pound capacity steel underframe flat cars.

Eight new passenger train cars were ordered but were not delivered until after the close of the fiscal year.

A contract was let during the year for the installation of a modern system of automatic electric block signals on the line between Chicago and Indianapolis; and construction was begun on new station buildings at Bloomington, Hammond and Rensselaer.

THE LOUISVILLE TERMINALS.

During the year the Kentucky and Indiana Terminal Railroad Company created and issued £1,231,000 (say $5,990,784.60) First Mortgage 4½% Fifty-Year Gold bonds, due January 1, 1961, with which it refunded its entire outstanding funded debt and provided for the construction of a new double track bridge across the Ohio River between Louisville and New Albany, the double tracking of its belt line, and the reconstruction and enlargement of its classification yards in Louisville. These bonds were guaranteed jointly and severally, as to principal and interest, by this Company, the Baltimore & Ohio Railroad Company and the Southern Railway Company, which together own in equal parts the entire capital stock of the Kentucky & Indiana Terminal Railroad Company, and have by contract agreed to use, during the life of the bonds, its bridge and terminal facilities for all their traffic in Louisville and crossing the Ohio River at Louisville. The fixed charges and operating expenses are distributed among, and borne by, the proprietary companies in the proportions of their several use of the property.

The Board records with pleasure its appreciation of the loyal and efficient services rendered by the officers and employees during the year.

Respectfully submitted by order of the Board.

FAIRFAX HARRISON,
President.

OPERATING COST STATISTICS, YEARS ENDED JUNE 30, 1911 AND 1910.

	1911.	1910.	Increase or Decrease.	Per Cent. of Inc. or Dec.
MILEAGE.				
Miles of Main Line of Road in Operation on June 30th	616.63	615.75	0.88	0.14
Average Miles of Main Line Operated During Year...	616.19	615.75	0.44	0.07
Average Miles of Main Line Maintained During Year.	577.71	577.71	0.00	0.00
MAINTENANCE OF WAY AND STRUCTURES.				
Total Charges	$799,007.53	$792,967.78	$6,039.75	0.76
Ratio to Operating Revenues	12.91	13.17	—0.26	1.97
Ratio to Operating Expenses	18.77	20.09	—1.32	6.57
Cross Ties Renewed.....	327,148	209,885	1,172.63	55.87
Cross Tie Renewals per Mile of Line Maintained.....	566	363	203	55.92
New Steel Rail Laid in Track, 75-Lb. Section, (Tons)	4,957.94	2,529.20	2,428.74	96.03
Total .....(Tons)	4,957.94	2,529.20	2,428.74	96.03

Miles of Track Laid with New Rail	42.07	21.46	20.61	96.04
New Ballast Placed in Track —Cubic Yards	47,436	34,560	128.76	37.26
Total Miles of Ballasted Track June 30	571.16	571.16	0.00	00.00
Percentage of Ballasted Track to Total Main Track Mileage Maintained	98.87	98.87		
MAINTENANCE OF EQUIPMENT.				
Total Charges	$878,721.75	$822,784.82	$55,936.93	6.80
Ratio to Operating Revenues	14.20	13.67	0.53	3.88
Ratio to Operating Expenses	20.64	20.84	—0.20	0.96
Average Number of Locomotives on Hand during the Year	127	122	5	4.10
Cost of Repairs per Locomotive, excluding Renewals and Depreciation	$2,723.26	$2,359.34	$363.92	15.42
Cost of Repairs per Locomotive, including Renewals and Depreciation	$2,978.38	$2,709.25	$269.13	9.93
Average Cost of Repairs of Locomotives per Mile Run, excluding Renewals and Depreciation (Cents)	8.08	6.95	1.13	16.26
Average Cost of Repairs of Locomotives per Mile Run, including Renewals and Depreciation (Cents)	8.84	7.98	0.86	10.78
Average Number of Passenger-Train Cars on hand during Year	107	107	0.00	0.00
Cost of Repairs per Passenger-Train Car excluding Renewals and Depreciation	$749.54	$753.32	—3.78	0.50
Cost of Repairs per Passenger-Train Car, including Renewals and Depreciation	$882.84	$905.01	—22.17	2.45
Average Number of Freight-Train Cars on hand during Year	5,985	6,023	—0.38	0.63
Cost of Repairs per Freight-Train Car, excluding Renewals and Depreciation	$49.21	$44.41	4.80	10.81
Cost of Repairs per Freight-Train Car, including Renewals and Depreciation	$57.35	$57.28	0.07	0.12
TRAFFIC EXPENSES.				
Total Charges	$201,556.09	$175,640.94	$25,915.14	1.48
Ratio to Operating Revenues	3.26	2.92	0.34	11.64
Ratio to Operating Expenses	4.73	4.45	0.28	6.29
TRANSPORTATION EXPENSES.				
Total Charges	$2,193,183.83	$1,973,814.49	$219,369.34	11.11
Ratio to Operating Revenues	35.45	32.79	2.66	8.11
Ratio to Operating Expenses	51.52	49.99	1.53	3.06
Transportation Expenses per Revenue Train Mile (Cents)	68.65	63.53	5.12	8.06
Locomotive Costs per Mile Run				
Enginemen (Cents)	7.96	7.09	0.87	12.27
Enginehouse Expenses (Cents)	1.64	1.74	—0.10	5.75
Fuel (Cents)	10.52	10.96	—0.44	4.01
Water (Cents)	.58	.53	0.05	9.43
Lubricants (Cents)	.30	.27	0.03	
Other Supplies (Cents)	.23	.26	—0.03	11.11
Total (Cents)	21.23	20.85	0.38	1.82
Average Number of Miles Run per Locomotive	37,196	37,334	—1.38	0.37
Average Number of Miles Run per Ton of Coal	11.88	11.94	—0.06	0.54
Coal Consumed—Tons	360,205	347,102	131.03	3.77
Train Costs per Mile Run				
Trainmen (Cents)	13.14	11.40	1.74	15.26
Train Supplies and Expenses (Cents)	3.16	2.92	0.24	8.22
Total Train Costs per Mile Run (Cents)	16.30	14.32	1.98	13.83

TWELFTH ANNUAL REPORT OF THE COLORADO & SOUTHERN RAILWAY COMPANY.

DENVER, COLO., July 1, 1911.

MR. D. MILLER,
President,
Chicago, Ill.

DEAR SIR:—I herewith submit the report for the fiscal year ended June 30, 1911, which report combines the operations and affairs of the lines operated by the companies named, and which are herein designated as the "Colorado & Southern Lines":

COLORADO & SOUTHERN LINES,
YEARS ENDED JUNE 30.

1911.	Per Cent. of Total Operating Revenues.	OPERATING REVENUES.	Per Cent. of Total Operating Revenues.	1910.
$11,120,361.01	70.27	Freight Revenue	71.77	$12,040,828.39
3,870,671.92	24.46	Passenger Revenue	23.35	3,918,092.98
216,068.73	1.37	Mail Revenue	1.02	170,391.82
280,613.32	1.77	Express Revenue	1.94	324,657.66
265,927.08	1.68	Miscellaneous Transportation Revenue	1.48	249,187.27
67,508.78	.43	Revenue from Operations other than Transportation	.43	72,652.85
2,913.67	.02	Joint Facilities	.01	2,169.76
$15,824,064.51	100.00	Total Operating Revenues	100.00	$16,777,980.73
		OPERATING EXPENSES.		
$1,688,223.20	10.67	Maintenance of Way and Structures	13.04	$2,188,644.76
2,779,142.78	17.56	Maintenance of Equipment	15.03	2,521,272.66
239,692.26	1.51	Traffic Expenses	1.64	274,271.16
5,112,951.78	32.31	Transportation Expenses	32.06	5,378,794.21
514,101.32	3.25	General Expenses	2.98	500,472.19
10,334,111.34	65.30	Total Operating Expenses	64.75	10,863,454.98
5,489,953.17	34.70	Net Operating Revenue	35.25	5,914,525.75
33,285.20	.....	Net Deficit from Outside Operations	.....	22,323.59
5,456,667.97	.....	Total Net Revenue	.....	5,892,202.16
478,323.05	.....	Taxes Accrued	.....	477,869.64
4,978,344.92	.....	Operating Income	.....	5,414,332.52
		OTHER INCOME.		
$42,920.85		Rents		$41,582.18
602,300.10		Miscellaneous Interest		586,043.92
645,220.95		Total Other Income		627,626.10
$5,623,565.87		Gross Corporate Income		$6,041,958.62
		DEDUCTIONS FROM GROSS CORPORATE INCOME.		
$471,846.44		Rents		$390,258.35
959.68		Miscellaneous Interest		3,975.05
2,811,682.34		Interest Accrued on Funded Debt		2,661,033.74
6,085.10		Extinguishment of Discount on Securities Sold		
34,399.94		Sinking Funds		35,058.19
3,324,973.50		Total Deductions		3,090,325.33
2,298,592.37		Net Corporate Income		2,951,633.29
1,300,000.00		Dividends		1,300,000.00
$998,592.37		Balance		$1,651,633.29
482,598.38		One-half of Deficit Trinity & Brazos Valley Railway Co.		466,718.00
$515,993.99		Surplus		$1,184,915.29

The percentage of Operating Revenues required for Operating Expenses was 65.30% as compared with 64.75% in the previous year, and the proportion of the Gross Corporate Income required for Interest on Funded Debt was 49.99% as compared with 44.04% in the previous year.

During the fiscal year, Refunding and Extension Mortgage Bonds of this Company were issued to cover expenditures for:

Additions and Betterments for the calendar year 1910	$1,067,890.00
And First Mortgage Bonds of C. S. & C. C. D. Ry. Co. were retired through Sinking Fund	33,000.00
Deferred Rentals under Equipment Leases were discharged	375,226.18
Making the net increase in Mortgage, Bonded and Secured Debt	$659,663.82

There were sold from the treasury of the Company $3,407,000.00 face amount of Refunding and Extension Mortgage Bonds; the proceeds of which reimbursed the treasury for expenditures made for new lines, equipment, and additions and betterments.

There were charges to Capital Account aggregating $4,770,749.55 for additions to the property. Of this amount there was expended for:

Structures and Machinery	$168,131.74
Substituting Permanent Bridges for Wooden Ones	104,226.05
New Line—Southern Jct. to Walsenburg Jct	1,344,037.27
New Line—Wellington to Cheyenne	844,802.09
Extension of Cheyenne Terminals	68,119.08
Additions to Denver Terminals	56,393.14
Elimination of Grade Crossings—Denver	103,872.67
Additions to Trinidad Terminals	20,587.54
Extension of Main Line	11,785.70
Additional Spur and Industry Tracks	44,844.72
Additional Yard Tracks and Sidings	50,665.15
Various Other Additions and Betterments	188,757.16
Additional Equipment	1,764,527.24

During the fiscal year the deficit from operations of The Trinity & Brazos Valley Railway Company was made up equally by The Chicago, Rock Island & Pacific Railway Company and The Colorado & Southern Railway Company. Construction of the new passenger terminals at Houston has been completed and paid for, and the terminals and passenger station have been in use since February last.

The new line of double track railroad which is being built in conjunction with the Denver & Rio Grande Railroad Co. between Southern Junction and Walsenburg Junction is nearing completion, and will be opened for operation about October 15, 1911.

This Company has since its organization in 1899 operated its trains over the tracks of the Union Pacific Railroad Co. between Denver and Cheyenne. Owing to increased business of both companies it was deemed advisable to construct a new line of single track railroad between Wellington, Colorado, and the northernmost point on the Fort Collins District, to Cheyenne, Wyo.; there to connect with this Company's Wyoming Division, and also with the Chicago, Burlington & Quincy Railroad. This new line, which will be thirty-two miles long, will be opened for operation about October 15, 1911.

The following statistical tables have been compiled in the form required for the Annual Report of carriers to the Interstate Commerce Commission:

CAPITALIZATION.

CAPITAL STOCK.

Designation.	Number of Shares.	Total Par Value Outstanding.	Dividends Declared During the Year. Rate.	Amount.
C. & S. Ry. Common	310,000	$31,000,000.00	2%	$620,000.00
C. & S. Ry. First Preferred	85,000	8,500,000.00	4%	340,000.00
C. & S. Ry. Second Preferred	85,000	8,500,000.00	4%	340,000.00
Colorado R. R.	5	500.00	...	.....
Denver & Interurban R. R.	7	700.00	...	.....
C. S. & C. C. D. Ry. Common.	9	900.00	...	.....
F. W. & D. C. Ry., including $23,884.00 "Stamped"	254	25,484.00	...	.....
W. V. Ry.	9	900.00	...	.....
W. F. & O. Ry.	9	900.00	...	.....
W. V. R. R.	9	900.00	...	.....
A. & N. Ry.	9	900.00	...	.....
S. & N. W. Ry.	9	900.00	...	.....
F. W. & D. T. Ry.	9	900.00	...	.....
Total	480,329	$48,032,984.00	...	$1,300,000.00

FUNDED DEBT.

Designation.	Total Par Value. Outstanding.	In Hands of Public.	Interest Accrued During Year.
Mortgage Bonds.			
C. & S. First 4 %	$19,402,000.00	$19,402,000.00	$776,080.00
*C. & S. Refunding and Extension 4½%	29,306,439.36	29,288,900.00	1,281,746.86
C. S. & C. C. D. First 5 %	1,638,000.00	1,638,000.00	82,518.20
C. S. & C. C. D. First Consolidated 5 %	1,379,000.00	1,379,000.00	68,950.00
F. W. & D. C. First 6 %	8,176,000.00	8,176,000.00	490,560.00
†F. W. & D. T. First 6 %	728,000.00	300,000.00	18,000.00
Equipment Lease, Deferred Rentals.			
C. & S., Series "A"	618,000.00	618,000.00	33,450.00
C. & S., Series "Pullman"	120,898.00	120,898.00	6,969.70
F. W. & D. C., Series "A"	234,000.00	234,000.00	14,300.00
F. W. & D. C., Series "B"	228,000.00	228,000.00	12,350.00
F. W. & D. C., Series "Pullman"	404,006.72	404,006.72	23,290.88
F. W. & D. C., Series "1908".	52,000.00	52,000.00	3,466.65
Total	$62,286,344.08	$61,840,804.72	$2,811,682.34

*$17,539.36 in Treasury or Pledged as Collaterel.
†$428,000.00 in Treasury or Pledged as Collateral.

EXPENDITURES FOR NEW LINES AND EXTENSIONS AND EQUIPMENT, AND FOR ADDITIONS AND BETTERMENTS, DURING THE YEAR.

Account.	New Lines and Extensions. From Current Funds.	Additions and Betterments. From Current Funds.	Total Expenditure.
I.—ROAD.			
Engineering	$75,960.04	$6,200.77	$82,160.81
Righ of Way and Station Grounds	126,452.57	41,212.05	167,664.62
Real Estate	.....	8,117.75	8,117.75
Grading	1,352,795.54	35,317.92	1,388,113.46
Bridges, Trestles and Culverts	387,369.21	122,021.01	509,390.22
Ties	82,119.90	34,281.35	116,401.25
Rails	104,973.30	62,517.41	167,390.71
Frogs and Switches	2,858.67	9,139.23	11,997.90
Track Fastenings and other Material	31,665.78	45,987.05	77,652.83
Ballast	7,011.60	41,651.56	48,663.16
Track Laying and Surfacing	16,945.70	20,550.25	37,495.95
Roadway Tools	.....	660.66	660.66
Fencing Right of Way	2,075.98	3,517.09	5,593.07
Crossings and Signs	16.15	88,789.54	88,805.69
Interlocking and other Signal Apparatus	.....	1,846.52	1,846.52
Telegraph and Telephone Lines.	.....	1,933.94	1,933.94
Station Buildings and Fixtures.	.....	85,932.63	85,932.63
Shops, Engine Houses and Turn Tables	.....	16,697.67	16,697.67
Shop Machinery and Tools	.....	9,464.74	9,464.74
Water Stations	3,395.94	25,450.40	28,846.34
Electric Power Transmission	.....	61,323.71	61,323.71
Miscellaneous Structures	.....	14,231.51	14,231.51
Rent of Equipment	3,720.08	.....	3,720.08
Repairs of Equipment	264.90	.....	264.90
Injuries to Persons	175.12	.....	175.12
Cost of Road Purchased	21,306.59	1,850.00	23,156.59
Total	$2,219,107.07	$738,694.76	$2,957,801.83
II.—EQUIPMENT.			
Steam Locomotives	.....	$325,150.92	$325,150.92
Passenger Train Cars	.....	36,945.64	36,945.64
Freight Train Cars	.....	1,570,472.61	1,570,472.61
Work Equipment	.....	Cr. 168,041.93	Cr. 168,041.93
Total	.....	$1,764,527.24	$1,764,527.24
III.—GENERAL EXPENDITURES.			
Stationery and Printing	$481.33	$97.58	$578.91
Insurance	578.04	.....	578.04
Interest and Commissions	45,110.18	Cr. 1,343.67	43,766.51
Other Expenditures	3,467.52	29.50	3,497.02
Total	$49,637.07	Cr. $1,216.59	$48,420.48
Grand Total	$2,268,744.14	$2,502,005.41	$4,770,749.55

MILEAGE STATISTICS.

Items.	1911. Miles.	1910. Miles.	Increase or Decrease. Miles.
Locomotive Mileage—Revenue Service.			
Freight Locomotive Miles	4,105,325	4,420,210	Dec. 314,885
Passenger Locomotive Miles	3,278,421	3,465,007	Dec. 186,586
Mixed Locomotive Miles	391,838	503,447	Dec. 111,609
Special Locomotive Miles	20,538	1,554	Inc. 18,984
Switching Locomotive Miles	1,495,698	1,738,234	Dec. 242,536
Total Revenue Locomotive Mileage	9,291,820	10,128,452	Dec. 836,632
Non-revenue Service Locomotive Miles	153,828	274,651	Dec. 120,823
Car Mileage—Revenue Service.			
Freight Car Miles.			
Loaded	56,653,374	61,776,103	Dec. 5,122,729
Empty	28,354,241	29,351,158	Dec. 996,917
Caboose	3,636,904	3,865,744	Dec. 228,840
Total Freight Car Miles	88,644,519	94,993,005	Dec. 6,348,486
Passenger Car Miles.			
Passenger	8,204,832	8,611,478	Dec. 406,646
Sleeper, Parlor and Observation.	2,128,060	2,351,700	Dec. 223,640
Other Passenger Train Cars	3,110,462	3,537,025	Dec. 426,563
Total Passenger Car Miles	13,443,354	14,500,203	Dec. 1,056,849
Special Car Miles.			
Freight, Loaded	157,671	8,003	Inc. 149,668
Freight, Empty	19,643	694	Inc. 18,949
Caboose	16,747	956	Inc. 15,791
Passenger	92,114	4,858	Inc. 87,256
Sleeper, Parlor and Observation.	24,969	3,534	Inc. 21,435
Other Passenger Train Cars	16,804	23,026	Dec. 6,222
Total Special Car Miles	327,948	41,071	Inc. 286,877
Total Revenue Car Mileage	102,415,821	109,534,279	Dec. 7,118,458
Non-revenue Service Car Miles	1,712,906	3,102,603	Dec. 1,389,697
Train Mileage—Revenue Service.			
Freight Train Miles	3,623,380	3,845,897	Dec. 222,517
Passenger Train Miles	3,192,406	3,363,329	Dec. 170,923
Mixed Train Miles	254,492	288,677	Dec. 34,185
Special Train Miles	20,386	1,554	Inc. 18,832
Total Revenue Train Mileage.	7,090,664	7,499,457	Dec. 408,793
Non-revenue Service Train Miles.	152,710	264,645	Dec. 111,935

Following is the report of the General Auditor, with statements prepared by him.

Respectfully submitted,

A. D. PARKER,
Vice-President.